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WITH profound regret we chronicle the death of Mr. Thomas Osborne Horton, President and General Manager of the New York and Richmond Gas Company, Stapleton, Richmond borough, New York. His death occurred at Pasadena, Cal., the morning of the 13th inst. The remains are *en route* for interment.

[Special Editorial Correspondence by Telegraph.]

PROCEEDINGS, SIXTH ANNUAL MEETING, IOWA DISTRICT GAS ASSOCIATION.

SIOUX CITY, IA., June 15, 1910.

Dear JOURNAL: The Sixth Annual Meeting of the Iowa District Gas Association opened this morning with the accompaniments of delightful weather and a good attendance. The President (Mr. George W. Waring) called the meeting to order promptly at 10 o'clock, and the first unwelcome thing about the meeting then occurred. This was in the shape of a statement from the President that, owing to the absence of the Secretary (Mr. G. I. Vincent), who was on a prolonged visit to the mountainous West in the hope that such visit would restore his impaired health (a condition actually brought about by overwork), a Secretary *pro tem.* was named in the person of Mr. Campbell Fair. The President then introduced Mayor Smith, who in a cordial address, well interspersed with fraternal compliments to his friend, Mr. L. L. Kellogg, welcomed the Association heartily to Sioux City. When I say that the response to the welcome, made by Mr. G. W. Clabaugh, was at once appropriate and felicitous, I have simply voiced a reality. Settling down to the routine of the convention the Association considered the Report of the Council for the past year. Among other things this document (and a well-put together one it was) noted that in the year; 19 new names were placed on the rolls, 9 resignations had been accepted, and 2 deaths were recorded, leaving the membership to date of report as follows: Active 74; Associate, 45. At this juncture the Secretary *pro tem.* asked that he be relieved from further duty and suggested the name of Mr. Thomas Hopper for his successor. This action and suggestion were indorsed, and the reports of the Secretary-Treasurer and of the Finance Committee were respectively considered. All these findings showed the prosperous condition of the Association from material and professional points of view. The annual message by President Waring next occupied, rather commanded, our attention. It was able, terse and convincing, and well merited the applause it evoked. The address having been referred to a committee for consideration, we listened to reports from Special Committees appointed to consider the various subjects of "Gas Works Construction," on "Operation and Distribution," and "On a Uniform System of Accounts." And while all were interesting from their common sense practicalness, the one on operation was especially so. The election for office bearers for the ensuing year resulted as follows:

President—Austin Burt, Waterloo.
First Vice-President—Geo. W. Clabaugh, Omaha, Neb.
Second Vice-President—Campbell Fair, Oskaloosa.
Secy.-Treas.—G. I. Vincent, Des Moines.
Members of Council—C. N. Chubb, W. A. Brice and A. [illegible] Boylen, for 2 year term; A. L. English, for 1-year term.

LIBRARY OF CONGRESS JUN.20 1910 SMITHSONIAN DEPOSIT.

At the announcement of the result a telegram heralding sympathy, strong hope and fraternality was ordered sent to Secretary Vincent. This brought the programme to the paper list. The first one read was that by Mr. Campbell Fair, on "The Gas Company's Policy Towards the Public." This number was enthusiastically received and evoked nothing but approval from the eight members who commented thereon. An adjournment was ordered, which terminated at 2 P.M., and the afternoon proceedings were ushered in by a lecture by Mr. Rufus C. Dawes, who discussed in forceful and convincing manner the tendencies of current thought and legislation respecting public utilities, and argued most coherently and cogently the right to a reward for ability exercised in the management of public utilities, whether named wisely or well. The next paper considered was that by Mr. E. B. Myers, on "Boiler Fuel Leaks." The paper itself was read by Mr. Fair. It was well discussed. The remainder of the session was devoted to a discussion of problems arising in the general operation of gas works, and it now looks that the paper list will be finished by the

evening of Thursday, the 16th. The Committee of Arrangements, the Entertainment Committee and our local hosts, the Sioux City Gas Company, with Mr. Kellogg in charge, have acted and are acting as they surely know how to act in their respective capacities as hosts and entertainers.—McL.

SIOUX CITY, IA., June 16, 1910.

Dear JOURNAL: The second day's session of the convention opened up by an addition of 6 to the 19 new members added to the roll yesterday, and by the selection of Clinton, Ia., as the place for next meeting. Mr. Norman Macbeth's lecture, on "Illuminating Engineering Factors in Gas Illumination," was delivered with the author's usual vim, force and interestingness, was heard with close attention and was awarded a hearty vote of thanks. It was well illustrated with lantern slides, and it is remarkable, despite the number of times Mr. Macbeth has lectured on this topic, the measure of new material that he manages to dig up for each succeeding portrayal is wonderful. This closed the morning session. The afternoon sitting was notable for the disposal of the paper list, the separate numbers being taken in this order: "How We Increased Gas Sales in Lincoln," by Mr. J. E. Shuff; and "Distribution in a Small Gas Plant," by Mr. A. W. Borden, of Hastings, Neb. Good discussions were had on these subjects. Owing to inability to be on hand in person, the lecture by Mr. J. B. Klump, of Philadelphia, on the "A. B. C. of Calorimetry," his notes will be read to morrow (Friday) by Mr. Macbeth, who also promises to illustrate the story by the plentiful use of lantern slides. As this is sent the members are about to embark for Riverside Park, where a shore dinner is to be served. If possible I will send word respecting the closing acts of to-morrow, although these would scarce reach you in time for the pressman, who never waits for "forms."—McL.

BRIEFLY TOLD.

JUNE MEETING, NEW YORK SECTION, ILLUMINATING ENGINEERING SOCIETY.—The last monthly meeting for the present season of the New York Section of the Illuminating Engineering Society was held, as usual, in the United Engineering Society's Building, the evening of the 9th inst., the topics chosen for discussion being of the order usually selected for a cold winter's night instead of a "rare day" in June. The attendance was correspondingly small. Chairman E. L. Elliott announced, as the first order of business, the election of Section officers for the ensuing year, which resulted in the unanimous election of the ticket prepared by the Nominating Committee, as follows:

Chairman—Dr. A. H. Elliott.
Secretary—Mr. A. J. Marshall.
Managers—Messrs. L. R. Hopton and S. G. Rhodes.

The first paper, on "Incandescent Lamps as Standards of Luminous Intensity," by Messrs. Clayton H. Sharp and Preston S. Millar, was read by the former. The interest taken by the authors in this subject apparently reaches beyond the commercial aspects of the case, and they presented a very strong argument in favor of this style of lamp as a standard. The fact that the paper remained undiscussed was not due to any lack of interest, but rather that those who would ordinarily speak forth were not at hand. The second paper, on "Photometric Units and Nomenclature," was then read by the author, Dr. Edward B. Rosa. A more profitable field for practical as well as academic research is hardly to be found in illuminating engineering, and Dr. Rosa is surely a master of the subject. His paper concludes with the suggestions for photometric quantities, symbols, etc., as given in Table I.

TABLE I.

Photometric Magnitude.	Symbol.	Unit.	Equation of Definition.
1. Intensity of light.	I	Candle	$I = \frac{F}{\omega}$
2. Luminous flux.	F	Lumen	$F = I\omega = \frac{IS}{r^2} = ES = \pi Q$
3. Illumination.	E	$\frac{\text{Lumens}}{cm^2}$ or $\frac{\text{milli-lumens}}{cm^2}$	$E = \frac{Fi}{S} = \frac{I}{r^2}$
4. Radiation.	E'	Lux = meter-candle	$E' = \frac{Fe}{S} = \pi e = mE$
5 Brightness	e	$\frac{\text{Candles}}{cm^2}$	$e = \frac{I}{S \cos e}$
6. Quantity.	Q	Candles	$Q = eS$
7. Lighting.	L	Lumen-hours	$L = FT$

I, e, Q are expressed in candles. F, E, E' are expressed in lumens. L is in lumens or spherical candles. $E' = \pi e$. $F = \pi Q$. Fi = incident flux. Fe = emergent flux. m = coefficient of diffuse reflection or transmission. $(1 - m)$ = coefficient of absorption.

The discussion was opened by Mr. V. R. Lansingh, who called attention to the discrepancy between the physical efficiency of a lighting installation and the visual efficiency owing to the varied conditions under which objects were viewed. This factor Dr. Sharp termed the physiological efficiency of the installation, and, as a condition which illustrates the effect of direct light on the eye, he cited the ease with which one could distinguish objects under bright moonlight when viewed from a dark room, which ceased to be true when the lights in the room were lighted. Speaking of the reduction factor (.785) for mean spherical candle power for cylindrical sources, he stated that this factor varied quite widely in commercial lamps, and so should be employed with great caution. The tantalum lamp, for instance, falls as low as .7, owing to the smooth surface of the filament, from which the loss was greater than the cosine of the angle of emission, as stated in Lambert's law.

THE ENDING OF THE CANADIAN MEETING.—Harking back to last week we here supplement the despatches signed "C. H." with some account of the finals of the meeting. Our story commences with the second day's proceedings (10th inst.), which commenced with the reading of a telegram from the Quebec Railway and Light Company, inviting the Association to meet in that city in 1911. This having been referred to ihe Executive Committee, the exceilent paper on "Gas Engine Development, Construction and Application," by Mr. R. A. Fraser, of Toronto, was considered. The discussion on this topic was shared in by Messrs. Hewitt, Wallace, Coates, Carter, Keillor, Buskard and Philip. In sequence was the lecture by Mr. Norman Macbeth, of Philadelphia, whose theme was "The Importance of Illuminating Engineering to Gas Companies." It is needless to say that the lecturer was listened to with attention, and his graphic sentences were all the more interesting through having been nicely punctuated by a plethora of well-handled lantern slides. Here it was decided to adjourn the business session until the following morning. The afternoon was spent in pleasant reunions of one sort or another and ubiquitous Mr. Smith, of the "Gas Show," was here, there and everywhere. The trip on the steamer "Turbinia," and its accompaniments will long be remembered by those who had the good fortune to share in its pleasures. Here, again, the local Company showed its unlimited, hearty hospitality. In fact, no praise is too great to give its representatives for their kindness and liberality. It was learned during the evening that President Norris was unexpectedly recalled to Montreal, and he was given a send-off that he will likely remember for time to come. And it should be here said that as a presiding officer he may properly be awarded the prize. Attentive, alert, right to the point, much of the success and enjoyment of the business sessions should and does undoubtedly belong and go to him. The last day's session was presided over by President-elect Hewitt, and, like his predecssor, he was a perfect Chairman. In fact it would be hard to conceive how this quiet, but vigilant, sedate but energetic gentleman could be other than a success, be that which he tried ever so difficult or perplexing. Under that quiet, unassuming guise is a plethora of will and determination of the true orderly sort. The third morning's business opened with the Report of Committee on Illuminating Power and Calorific Value of Gases Made in Canada. Its findings and presentation—these were made by Messrs. Hewitt and Keillor—showed that the work of the Committee was neither perfunctory nor neglected. To the contrary, it was practical and thorough, showing that time, thought and joint consideration had been given the subject. The final technical number was a useful, clearly put accounting respecting "Recent Gas Installations in Hamilton," by Mr. E. A. Howe, the local Company's new business solicitor. In this recounting the author showed how much can be accomplished by persistence tinctured with judgment. The closing chapters were of a nature going to show that fraternity surely animates the breasts of our "Border Brothers." Mr. McNary was called for, and that unsuspecting gentleman, on stepping forward, was, to his utter astonishment, presented with a handsome umbrella, supplemented by a walking stick, that savored not of the "big" variety. Mr. A. W. Smith was quite shocked when a "big handful" of shining gold pieces was placed in his palms, and his two feminine assistants added to their charms by blushingly receiving handsome jewelry souvenirs of their willingness to keep up the routine work of the exhibition. All these gentle reminders were given with the best wishes of the exhibitors in Canada's First Gas Show. It was a good meeting, one in the technical and social sides of which it was pleasant to be a sharer.

CURRENT MENTION—

"A FAITHFUL, staunch and worthy employee was lost to the Shelbyville (Ind.) Gas Company when death claimed Daniel Meloy, whose summons came early the morning of the 9th inst., at his home, North Tompkins avenue, Shelbyville. His death followed an operation for the relief of a bowel cancer, which operation was performed in an Indianapolis Hospital. The disease had progressed too far to be conquered by the surgeon's aid. He entered the service of the Shelbyville Company in 1875, in a subordinate capacity, and shortly thereafter he was appointed works' Superintendent, which position he held at the time of his death. He was born in Shelby county, March 25, 1841, and lived within its confines all his life. His first employment was in the, at one time well-known, stave factory, which was owned and operated by the late Mr. Jasper Sprague, who was one of the original settlers of Shelbyville. The funeral services were held the afternoon of Sunday, the 12th inst., the Rev. J. P. Myers officiating. He is survived by his widow, a son and a daughter. also two brothers. All are residents of Shelby county.—L. L. M."

Some Quick Repair Jobs in Gas Plants.

[Prepared for the JOURNAL by a "HANDYMAN."]

The grate bars fell down in the fireboxes in the steam plant in a certain gas plant, the happening being due to the breaking-off of a portion of the metal lip supporting the same, together with the bulging out of the front of the boiler. The two factors combined allowed about half of the bars to slip over the ends and tumble down, while the other half just barely supported themselves with a narrow margin. Fig. 1 shows the condition of the lip and the end of one of the bars—the juncture at *A* is where the separation occurred. The boiler plant was in active operation all the time and there appeared to be no interval in which the plant could be stopped so that extensive repairs could be made to remedy the difficulty. A careful examination revealed ashes, cinders and clogging properties of various kinds pushing back of the metal lip in such way that the lip was distorted. I first removed all of this foreign matter, then cut off the entire original projecting lip, as it was in bad condition, and provided a new bar for supporting the ends of the grate bars, as shown at *B*, Fig. 2. This bar consisted of a strong piece of wrought iron, properly adjusted at the terminals into the brickwork of the firebox, for which purpose a number of bricks were removed. This new bar supported the grates very well.

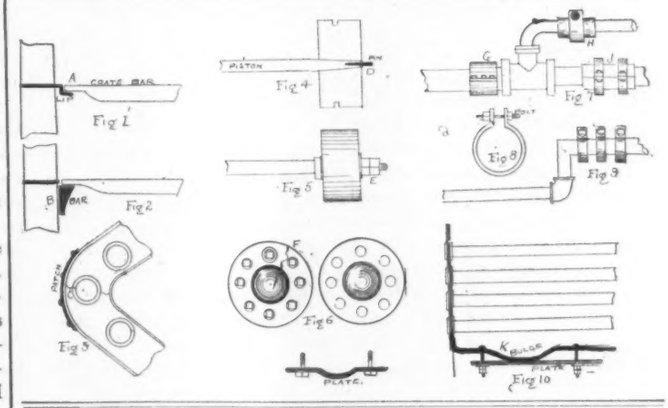
Fig. 3 shows how I patched a cast iron header. In this case the steam and water were leaking and blowing out on a small scale, with every indication of the leak expanding and getting worse. The fire had to be pulled, and as a new cast iron header could not be obtained for some weeks, since the makers of the boiler would have to be corresponded with, we simply got a patch of ¼-inch thickness steel plate, heated it and hammered it to the shape required to fit over the break in the cast iron header, as shown at *C*, Fig. 3. The patch was held firmly over the leaky place by means of a number of set-screws which we tapped into the metal, and the leak was effectively stopped while work in the plant continued.

A piston in a single-acting, dry gas engine, getting loose on the rod, commenced creating a series of thumps and grindings. At first we thought some loose pieces of metal were being knocked about in the cylinder. At any rate something had to be done, and as a shutdown was not possible at that period for any length of time, we trusted that a quick repair job could be completed. Upon examining the interior of the cylinder we found that the 22-inch diameter piston was of a kind which had been shrunk on the tapering end of the rod, as shown in the sectional drawing, Fig. 4. This was a bad job to handle, it seemed, until we decided to bore and split the end of the conued terminus of the rod and drive in a steel pin, as at *D*. Oddly enough this pin remains to-day, and there has been no occasion to remove the same, or to put in a new combination, as was intended when this emergency scheme was tried. The pin was driven hard and caused to hold well by expanding the end of the rod in the journal of the piston.

In another case of similar character we made a threaded end on the rod and put on a double or lock nut system, as at *E*, Fig. 5.

In another case the follower of a piston on a duplex pump got split in some way. Evidently an extraordinary exertion of the pressure on a weakened head resulted in the break, as shown by the crack at *F*, Fig. 6. In order to fix this defect we actually moulded a new head, using the old head as a model. Fig. 6 shows the new piece at the right and a section of the piece is shown in the same cut. We accomplished this end by using ¼ inch soft steel plate. The plate was cut to the right sized disk and the middle hammered out to make the ball-shape fit over the similarly balled end of the cracked head. Then the necessary bolt holes were drilled and the new head piece was simply bolted with proper packing over the broken head, rendering the latter tight.

It is a good plan for all gas engineering mechanics to have quick-repairing clamps on hand, for use as illustrated at *H*, *G* and *J*, Fig. 7. These clamps are simply steel rings with the clamping bolt or bolts arranged so that the sides of the ring may be drawn up securely on the fractured or leaky place in the pipe or tube. Sometimes felt, rubber, canvas, wood, metal or other material is used as a base on which the clamping may be done. Fig. 8 is a side drawing of one of the handy clamps, and Fig. 9 shows how three of the clamps may be used together. I had a job to get a bulge back in place in a boiler, as at *K*, Fig. 10, said a certain mechanic to the writer. The swelling was due to overheating in the firebox at a point where scale collected inside the boiler and prevented the cooling effect of the water on the metal. The workman could not restore the swelling to its former level, but he prevented further bulging and strengthened the part by fastening the steel plate beneath the bulge, as shown. This plate was wide enough to cover the lower part of the bulge. It was drawn up securely with bolts inserted from inside the boiler. The plate protected the weakened original plate from further damage from the fire.



[Prepared for the JOURNAL.]

Gas Franchises and Privileges: Their Legal Characteristics and Constructions which the Courts have Placed upon Them.

[By MR. JOHN EDSON BRADY, Attorney-at-Law.]

The business of manufacturing and selling gas is not a prerogative of government; and, like the manufacture and sale of any other commodity of traffic, it is open to all, and may be carried on by any person without legislative authority. But the right to dig up the streets and highways, for the purpose of placing pipes and mains for the distribution of gas for public use, is a franchise, the privilege of exercising which can be granted by the State only, or by a municipality, or some other local agency acting under legislative authority. In other words, a legislative grant is necessary before any person or corporation may engage in the business of producing and distributing illuminating gas. For the right to use the streets of a city for the purpose of laying pipes to convey gas is a franchise, and as such can emanate only from the sovereign power of the State. To this effect may be cited a decision of the Supreme Court of Louisiana, in Crescent City Gas Light Company *v.* New Orleans Gas Light Company (27 La. Am., 147), in which it was said: "The right to operate gas works, and to illuminate a city, is not an ancient and usual occupation of citizens generally. No one has the right to dig up the streets and lay down gas pipes, erect lamp posts, and carry on the business of lighting the streets and the houses of the city of New Orleans, without special authority from the sovereign. It is a franchise belonging to the State; and, in the exercise of the police power, the State could carry on the business itself or select one of several agents to do so."

Under proper management the business of the manufacture and distribution of illuminating gas contributes very materially to the public convenience, while, in the absence of effective supervision, it may disturb the comfort and endanger the health and property of the community. It also holds important relations to the public, through the facilities furnished, by the lighting of streets with gas, for the prevention and detection of crime. An English historian, contrasting the London of his day with the London of the time when its streets, supplied only with oil lamps, were scenes of nightly robberies, says that "The adventurers in gas lights did more for the prevention of crime than the government had done since the days of Alfred." Municipal corporations constitute a part of the civil government of the State, and their streets are highways, which it is the province of government by appropriate means to render safe. Authority for the proposition that the supplying of gas to a city and its people may become a public purpose is found in New Orleans *v.* Clark; 95 U. S, 652. That case involved the liability of a municipal corporation upon coupon bonds issued to the company which had undertaken, for a valuable consideration, to light its streets with gas. Mr. Justice Field, delivering the opinion of the court, said: "A private corporation, as well as individuals, may be employed by a city in the construction of works needed for the health, comfort and convenience of

its citizens. And though such works may be used by the corporation for its own gain, yet, as they advance the public good, the corporation may be properly aided in their construction by the city; and for that purpose its obligations may be issued, unless some constitutional or legislative provision stands in the way."

Construction of Legislative Grant.—In People, *ex rel.* Woodhaven (L. I.) Gas Company *v.* Deehan; 153, N. Y., 528, the plaintiff was a gas company, organized under the laws of New York, for the purpose of supplying gas for lighting the streets, public places and private buildings in the town of Jamaica, Queens county. After the Company was incorporated the municipal authorities granted the consent required by the statute, authorizing the Company to place its pipes in the streets and highways of the town. The grant by its terms included the entire town, and was not confined to any particular street or other local division. Subsequently a portion of the town of Jamaica was incorporated into the village of Richmond Hill, for the purpose of village government; but it still remained a part of the town of Jamaica, as before. The trustees of the newly formed village proceeded to make ordinances and regulations with respect to the use of the streets, and, among other things, enacted that no person should alter or disturb the grade of any street or public place without a permit from the Street Commissioner; and that no person or corporation should dig in or upon any public place without such a permit. The Company applied to the defendant, who was the Street Commissioner of the village, for the necessary permit to lay its pipes in that part of Broadway, one of the streets or highways of the town, which was embraced within the village limits, offering at the same time to comply with all the requirements and conditions of the village ordinance. The permit was refused and the Company applied for a peremptory writ of manda mus requiring the defendant to issue the permit upon compliance with the conditions of the ordinance.

The writ of manda mus was granted. It was argued that the portion of Broadway, in which the Company wished to place its pipes, was not in existence as a street or highway at the time the town authorities consented to the use of them by the Company, and that, therefore, the consent did not apply to that part of Broadway. The grant gave the Company the right of "laying conductors for conducting gas in and through the public streets and highways of said town of Jamaica." It was held that, there being no express limitation, the grant would not be deemed restricted to existing streets and highways, but was broad enough to cover streets and highways subsequently opened. The rule that public grants are to be construed strictly against the grantee means simply that nothing shall pass by implication, except it be necessary to carry into effect the obvious intention of the grant. But the obvious intention of the parties cannot be ignored in a public grant any more than in a private grant. A construction that would lead to false consequences or unjust or inconvenient results, not contemplated or intended, should be avoided in a grant as well as in a statute. And in the construction of such a grant it must be remembered that the business of the manufacture and sale of gas is based largely upon calculations of future growth and expansion. Quoting from the Court's opinion: "A franchise for supplying gas not only confers a privilege but imposes an obligation upon the corporation to serve the public in a reasonable way. The relator (plaintiff gas company) is bound to supply gas to the people of the town upon certain conditions and under certain circumstances, and it would be most unjust to give such a construction to the consent as to disable it from performing its obligations. It cannot be reasonably contended that the relator is obliged to apply for a new grant whenever a new street is opened or an old one extended, as would be the case if the consent applied only to the situation existing when made. When the right to use the streets has been once granted in general terms to a corporation engaged in supplying gas for public and private use, such grant necessarily contemplates that new streets are to be opened and old ones extended from time to time, and so the privilege may be exercised in the new streets as well as in the old. Such a grant is generally in perpetuity, or during the existence of the corporation, or at least for a long period of time, and should be given effect according to its nature, purpose and duration. There is no good reason for restricting its operation to existing highways, unless that purpose appears from the language employed. It is not claimed that any such limitation was expressed, and none can be implied from the nature of the case. The language of the consent confers the right to place the conductors in the streets, upon compliance with reasonable regulations, not only as the streets then existed, but as subsequently enlarged or changed. That is what the grant contemplated when made, and such is the fair meaning of the language used."

Right of City to Change Street Grades.—A gas company, laying its pipes in the streets of a city, under a grant from the latter, in conformity with an established grade, does so subject to the right of the city to change the grade of the street whenever the necessities of the public require it; and, in the absence of wantonness or negligence on the part of the city, the gas company may not maintain an action against the city for damages occasioned by the necessity of taking up and relaying its pipes. This was decided in Columbus Gas Light and Coke Company *v.* City of Columbus, O.; 33, N. E. Rep., 292. The Company had filed a claim against the city for $406.60, which it had been compelled to expend because of the regrading of one of the streets in the city. The claim being rejected, suit was brought. And, as above stated, it was held that the city was not liable. "It must always be kept in mind," said the court, "that the primary use of the streets is not for the laying of gas pipes. That is but an incidental—a secondary—use. Above all other uses is the accommodation of the public travel. * * * The grant by the city must be interpreted in the light of the right and duty of the city to regrade, whenever in its judgment the public interest demands; and whatever easement the gas Company can receive, it must accept and enjoy in common with equivalent rights which have been or may be acquired by other public agencies—rights of a like secondary character; and all must give way to the paramount duty of the city to take care of the streets, and keep them open, in repair, and convenient for the general public. This duty would be seriously interfered with if the city could not change the grade of its streets, save upon the condition that it should make compensation to every gas company, and water company, and telephone company, and electric light company, and street railway company, for inconvenience and expense thereby occasioned."

A somewhat similar case in Louisiana: New Orleans Gas Light Company *v.* Drainage Commission; 35 So. Rep., 929. The Company brought suit to recover damages incurred because of its being required to change the position of its mains. The defendant admitted that the Gas Company was given the exclusive right to sell gas in the city of New Orleans, and that, as a necessary incident to enable the Company to carry on the business of supplying the public with gas, it had been granted the right to lay its pipes and mains under and through all the streets and alleys of the city. But the defendant maintained that the Company had not been given an exclusive right to the use of the streets, nor a property right in or to any particular portion of the street. The Legislature did not designate the particular streets or parts of streets in which the Company should lay its pipes, nor vest the municipal authorities with power to permanently locate them. The whole subject was left to the judgment and at the risk of the Gas Company, with only a warning that they should be laid in such a manner as to least inconvenience the public. And so, the State, in requiring the plaintiff Company to shift the position of its mains, to permit the construction of a system of drainage, only did what it had reserved the right to do, or, rather, simply enforced, in its own favor against the plaintiff Gas Company, one of the conditions upon which the right of the use of the streets had been granted to it. In its opinion the court said: "We cannot recognize that plaintiff had or has any vested right in the premises to occupy any particular part of the public streets. If its right in the premises could be designated as a property right, it was *ab initio* not a perfect, but an imperfect, right, contingent and conditional in its nature and character, held subject to the paramount right of the State over the right, and controlled by law and regulation of the police authorities."

Exclusive Franchises.—Apart from statutory authority it is not within the power of a municipal corporation to grant to any person or corporation engaged in supplying gas to consumers a monopoly of its streets. But gas privileges and franchises are frequently made exclusive by the terms of the legislative grant, and the constitutionality of such legislation has generally been upheld.

But grants of exclusive privileges to gas companies must be strictly construed against the grantee and in the interest of the public. They will never be extended beyond their obvious meaning, and the grantee takes nothing by implication. And a grant of an exclusivs right to supply gas to a municipality and its inhabitants must be made in express words. Such a grant will never be implied.

It has been held that a State can grant a corporation or an individual the exclusive right to operate a railroad between certain points, or to maintain a bridge or operate a ferry over a navigable stream at a particular place. For instance, it appeared in the case of The Binghamton (N. Y.) Bridge, reported in 3 Wall., 51, that a charter had been granted to a company authorizing it to build and maintain

a bridge across a river in New York for the accommodation of the public. The company was then given the right to collect tolls, and it was provided that it should be unlawful for anyone to erect a bridge, or establish a ferry, within a distance of 2 miles on that river, either above or below the company's bridge. A statute was passed authorizing the construction of a new bridge within a few rods of the old one. The argument was strenuously pressed in favor of the owners of the new bridge that the legislature could not dispose of the exclusive right of passing over a great river for the distance of 4 miles. The Court held that the first company's charter was a contract between it and the State, within the protection of the Constitution of the United States, and that the charter to the second company was, therefore, null and void.

Numerous other cases could be cited as establishing the doctrine that the State may by contract restrict the exercise of some of the most important powers. Arguing from these authorities, the court, in New Orleans Gas Light Company *v.* Louisiana Light, etc., Company; 115 U. S., 650, said:

"If the State can, by contract, restrict the exercise of her power to maintain highways, bridges and ferries, by granting to a particular corporation the exclusive right to construct and operate a railroad within lines and between certain points, or to maintain a bridge or operate a ferry over one of her navigable streams within designated limits; if she may restrict the exercise of the power of taxation, by granting exemption from taxation to particular individuals and corporations, it is difficult to see upon what ground we can deny her authority—when not forbidden by her own organic law—in consideration of money to be expended and important services to be rendered for the promotion of the public comfort, the public health, or the public safety, to grant a franchise, to be exercised exclusively by those who do for the public what the State might undertake to perform either herself or by subordinate municipal agencies."

In granting an exclusive franchise the Legislature says to the public spirited citizens who undertake the important work authorized by the grant: "If you will embark, with your time, money and skill, in an enterprise which will accommodate the public necessities, we will grant to you for a limited period, or in perpetuity, privileges that will justify the expenditure of your money and the employment of your time and skill." Such a grant is a contract, with mutual considerations, and justice and good policy alike require that the protection of the law should be assured to it.

The argument that there is justice in the granting of exclusive privileges applies particularly to gas companies. The manufacture of gas is a business of a public nature and one which meets a public necessity. It is one which, far from affecting the public injuriously, has become one of the most important agencies for the promotion of public convenience and public safety.

It may be presumed that the Legislature of a State, when granting an exclusive privilege to a gas company, does so because it deems it unwise to burden the public with the cost of erecting and maintaining gas works sufficient to meet the public need, and feels that the public interest will be best served and protected through a single corporation invested with the power and charged with the duty of supplying gas of the requisite quality and in such quantity as the public requirements demand. In order to accomplish what, in its judgment, the public welfare demands, the Legislature may deem it necessary that some inducement be offered to private capitalists to undertake the work at their own cost. The most logical and valuable inducement is the grant of an exclusive franchise.

Right to Transfer Franchise.—As a general rule a gas company cannot sell or lease the rights and privileges secured to it by its franchise, without the consent of the legislature, and in some States this prohibition is enforced by statute. One reason for this rule is that, if gas companies were able to sell or lease their corporate powers and franchises without legislative authority, they might disable themselves from their public duties. Another objection to traffic in such corporate franchises is the ease with which such a power could be used to create monopolies. By its exercise a single person could easily become possessed of the corporate powers and privileges of all its rivals, and thereby annihilate competition and obtain a complete control of the market—XIV. A. & E., Encyc., 924.

To the argument that similar combinations may be made by individuals, it has been aptly replied that men are mortal and their combinations short lived, but corporations are immortal and their combinations and acquisitions may go on forever; that they may add field to field, wealth to wealth, and power to power, till they become too strong for the government itself; and all experience shows that such accumulations of wealth and power are dangerous to the public welfare. While society can endure the accumulations and combinations of mortals, which must end at the grave, it cannot endure similar accumulations and combinations of power by corporations which may continue forever.

In a case in New Jersey, decided in August, 1892, it was said that corporations, which engage in quasi public occupation, such as railway, water, gas, telegraph and similar corporations, are created upon the hypothesis that they will be a public benefit. They usually possess the right of eminent domain, and not infrequently the use of public highways is accorded to them. While the State confers upon them these special and extraordinary privileges, it at the same time exacts from them the performance of public duties. It was pointed out that such corporations hold their franchises not merely in trust for the pecuniary profit of their stockholder, but also in trust for the public, and that they cannot lease or otherwise dispose of their franchises, needful in the performance of their public duties, without the consent of the legislature; Stockton *v.* Railroad Company; 24, Atl. Rep., 964.

In a case decided by the Supreme Judicial Court of Maine, it appeared that the Brunswick Gas Light Company undertook to lease all its property and all its corporate rights and privileges to the United Gas, Fuel and Light Company, for a period of 25 years. The latter Company took possession of the works and held them for 17 months, making various improvements and paying a portion of the agreed rent. It then abandoned the plant and possession was resumed by the lessors. This was an action by the lessors against the lessees to recover the balance of the rent. It was held that they could not recover according to the terms of the lease, because the lease was one which could not lawfully be made.

Nor, where it is required that a gas company obtain the consent of the municipal authorities before laying its pipes, can a company which has obtained such consent transfer that consent to another company. In the case of City of Brooklyn *v.* Fulton Municipal Gas Company, 7 Abb., N. C., 19; it appeared that the Mutual Gas Light Company had been incorporated in 1875 under the general statute authorizing the formation of gas companies. The Company, after having purchased land and contracted for the construction of its plant, obtained the consent of the municipal authorities, on giving the required bonds, to lay its pipes in the streets of the city of Brooklyn. Later the Company found it expedient to suspend operation, and thereupon conveyed all its property to the defendant, the Fulton Municipal Gas Company. The defendant Company claimed that, as incident to the property which it acquired, it gained the right to place its pipes in the streets; that the permission granted to the original Company inured to the defendant's benefit. Said the Court: "The argument is very subtile. It makes the consent, given expressly to the old Company as such, negotiable, a thing capable of being passed to and from these defendants indefinitely. It seeks to so combine that consent with a supposed legislative grant as to constitute an easement. * * * But the infirmity of the argument lies more obviously in the attempt, intended or not, to evade the statute. The legislature intended that there should be an immediate relation between the city and the corporation carrying on its operations in the streets, and perhaps unduly interrupting travel, to the prejudice of the citizen. The corporation, any corporation formed under the act, as the defendants were, may have power to lay gas conductors in the streets, with the consent of the municipal authorities. Shall any such corporation acquire that power in some other manner? I think not. The books are full of cases in which the courts have discouraged attempts to depart from the terms of statutes or to qualify their exactions."

But, while a gas company may not sell or assign the privilege of manufacturing and selling gas conferred upon it, it may surrender the exclusive right to such privilege. In City of St. Louis *v.* Gas Light Company, 70 Mo., 69, the charter of the Gas Company gave it the exclusive right to manufacture and sell gas in the city of St. Louis. The Company afterwards made a contract by which it surrendered and abandoned its exclusive right to have gas works, lay pipes or furnish gas in a particular district of the city north of a certain line. It simply parted with the right, given it under its charter, to exclude all other companies from that district, but did not bind itself not to do a gas business there in common with other companies if it saw fit to do so. The Supreme Court of Missouri had this to say on the question: "This right to exclude competition was not a right vested in the Company for the benefit of the public, because in its

very nature it was injurious to the public; but it was a right vested in the Company for its own benefit, which it might, therefore, surrender with the consent of its stockholders. The right to make and vend gas to the city and its inhabitants was a right conferred upon the Company for the benefit both of the Company and of the public, and not for the sole benefit of either; but the right to exclude competition was solely for the benefit of the Company. If, by its contract, the Company surrendered a right to make and vend gas in that portion of the city described therein, then the position taken by the counsel, that it had abandoned a public duty, is maintainable. We do not think that said provision is susceptible of that construction, but, on the contrary, it is expressly declared 'that both of said Companies, or any other company or individual, shall be permitted to exist and do business in the aforesaid district or portion of said city without hindrance.' We think it clear that the St. Louis Gas Light Company did nothing more than surrender its right to exclude all competition in that part of the city lying north of Washington avenue; reserving to itself the right to meet any demand which might lawfully be made upon it by the public. There is no abandonment or surrender on the part of the St. Louis Gas Company of its right or duty to make and vend gas north of the south line of Washington avenue."

(To be Continued.)

[Prepared for the JOURNAL]

A British New Business Department.

By MR. GLENN MARSTON.

The Gas Light and Coke Company, of London, controls the entire gas business of London and vicinity, and is in competition with over a score of electric plants, both municipal and private. This competition has necessitated a strenuous campaign for new business, which has been carried on both by solicitation and a constant effort to show the public how important a gas company is to the welfare of the community. The result of the "public policy" campaign has been so successful that hard words for the Company are almost never heard, and a solicitor can attack a prospect with the assurance that he will not have to overcome any groundless prejudices against the Company before he can begin to talk business.

Roughly speaking, The Gas Light and Coke Company is divided into three departments. From the retort to the holder the gas is under the absolute charge of the engineering department. From the holder to the meter the distribution department holds sway, while the inspection department is responsible for everything between the meter and the smoke on the ceiling. Their chief business is disposing of the Company's product.

The Company's territory is divided into 77 inspection districts. The chief inspector controls all relations for supply of gas and apparatus; the inspection department does all business promotion, publicity and the handling of appliances. There is an inspector for every district, who has one or more assistants as the demands of the district may warrant.

It is felt that the "maintenance contract" is the strongest weapon against electrical competition. This is a contract which calls upon the Company to make a lighting installation, and to maintain it after installation at a certain quarterly cost to the patron. Maintenance includes regular inspection and cleaning, renewal of mantles, etc.

The Company maintains an extensive appliance department, which is patronized by practically all customers. Appliances can be purchased, however, from hardware dealers, the Company keeping in close touch with such dealers. Most dealers sell appliances on commission, on behalf of the Company. This arrangement gives a stability in prices and a diversity in stock that it would be difficult to obtain otherwise.

When a stove is sold, for example, the dealer notifies the Company, which proceeds thereupon in the same manner as if the Company itself had sold the stove. A number of cooking demonstrators (ladies, of course) are employed. Every stove is followed by a letter advising the purchaser that a demonstrator will call in a day or two to give full instruction as to operation.

Frequent lectures are given at different centers, often being in the district offices. These lectures deal with the various uses of gas and are attended by an average of 50 to 60 people each. The only publicity given to such lectures is the posting of a notice in the district office, giving the date and subject to be considered. Each district office has a showroom, and many people attending the lectures are attracted by the nearby display, the result being a large number of sales which would not otherwise be made. The Gas Light and Coke Company catches its customers on the wing and makes its strongest selling arguments when the prospect is sure to be in a receptive mood. It is felt that any person who is sufficiently interested in gas to attend one of the lectures is interested enough to make a purchase, if approached at that time; so the iron is struck while it is hot.

On the other hand, the Company's efforts are not wholly exhausted in caring for those already showing an interest in gas. A considerable number of canvassers are kept constantly engaged in making a house-to-house solicitation, regardless of whether the house is piped or not. The canvassers are under the direction of the district inspectors and, with the assistance of the Company's very attractive publicity matter, are able to increase the consumption of gas very materially.

The publicity matter (see JOURNAL, *ante*, p. 988) includes a 24-page stove catalogue covering all standard makes and giving complete particulars as to cost, either by cash purchase, installments or rental. The maintenance contracts are also given wide publicity. They are made both for lighting and stoves, and cover houses, shops, factories and all classes of buildings. Each visit of the maintenance man offers opportunity for suggestions for increased use of gas, and this fact is not lost sight of in choosing employees to carry out maintenance contracts.

A maintenance contract is of great value to the company where the customer has electric light, for example, and a gas stove. The maintenance man can inspect the stove and offer suggestions as to lighting which often result in the displacement of electricity. In order to encourage solicitation of this sort the Company offers a bonus for replacing electric light with gas. The bonus applies on each burner over a certain number secured during each 3 months, and is only paid when gas displaces electricity. The Company recognizes that certain districts present more difficult conditions than others in replacing electricity with gas, and the minimum to be secured before the bonus payments are begun varies widely according to the circumstances. The Company makes every effort, however, to distinguish between the natural ease of securing such replacements and the energy of the solicitor, so that no discount may be put upon efficient canvassing. A bonus is also offered to solicitors who increase the number of maintenance contracts in their territory.

In addition to the lectures for the benefit of the public the Company has an auditorium at Hackney at which there is a nightly lecture during 8 months of the year. These employees' lectures are delivered by experts and cover every phase of the Company's activities. While attendance is not compulsory, certain men are instructed to attend on certain evenings, and it is seldom that such a man absents himself. It is not usual for employees to attend the meetings unless so instructed. In this way a lecturer is able to thoroughly cover whatever subject he may have in hand with the assurance that it commands the vital interest of everyone of his auditors, while the employees know that when they get instructions to attend a lecture the subject to be treated is one which demands their attention and study.

Public lighting is handled by a special sub-department under the chief inspector, and its methods are similar to those followed by the specialists in any of the other sub-departments. The "local authority" is treated on exactly the same basis as any other large customer, and concessions in price are only such as would obtain with any customer consuming a similar quantity of gas. Friendly relations with municipal officials are carefully cultivated. Most public lights are contracted for on a basis of 4,300 hours a year; some, however, being for 3,940 hours a year. The prices for public lighting include lighting, extinguishing and maintenance, all attendance being supplied by the Company. A small proportion of the public lamps has a constant pilot light, and lighted by an increase of pressure. This style of light is being adopted in replacing old lamps.

On account of the heavy fogs for which London is famous, it is necessary to make special provision in the contracts for extra lighting. Payment for such extra lighting is made on an hour basis, and is sufficient to cover the additional attendance necessary. It frequently happens that London is as dark at noon as at midnight—darker in fact, for the fog not only permeates every cranny, but it seems to soak up every particle of light, so that one cannot even see the illumination on the opposite side of the street. Lighting under such conditions is difficult, yet it is the provision for such daytime lighting that makes the public lighting of London seem so far superior to that generally found in America.

In a number of cases the Gas Company has replaced electric street lighting through the lower cost of gas per candle power of illumination provided. It is said to be difficult, however, to secure gas street lighting in districts supplied by municipal electric plants, even though it is shown at times that the Company pays one-sixth of the total taxes and has to contribute to the support of its competitor.

It is constantly borne in upon the employees and customers of the Company that the Company's relation to its patrons and prospective patrons is much the same as that of a doctor to a patient, and that anyone may come to the Company for advice with the certainty that the Company and its employees will hold all confidences inviolable. As if to emphasize this relation, the Company has recently been carrying on a campaign among physicians, looking toward the wider adoption of gas grates. Physicians are offered a free trial for 30 days of any gas grate they may choose. At the end of the approval period the grate is either sold or rented to the physician, and it is said that none of the 6,000 grates placed in this manner has been returned at the expiration of the trial.

The Visitings of a Veteran.

By a "Veteran Gas Engineer."

In making a sort of vacation trip to the Pacific Coast the predilection of a veteran gas man to visit gas works *en route* could not be eliminated, despite a good (?) resolution, when leaving old Virginia in April last, not to go, even within smelling distance, of a place where gas could or would be made on the trip. And so it happened that the writer visited a number of works; in fact, all where the train timetables admitted, a proverbial contribution to the paving of the great and wide road to that other hot place which, it is hoped, all good gas men shall not be called on to visit, since they had "there'n" on this earth. As usual, on former journeys, so on this one, the subscriber found at least one, and often a number, of things that were new, instructive and admirable at each of the many gas works and distribution stations visited. But at Portland, Ore., your correspondent found something, which he believes to be of such importance and value in a financial way to gas men, that mention of the same in the American Gas Light Journal may appeal to the approval of its readers, for it concerns a subject which may become one of vital importance at any time. It is no less than the complete removal of sulphur from gas. It may happen most any time that some professional reformer or other, having failed in the customary methods to extract "graft juice" from gas companies, may hit upon the fact that there is some sulphur in all gas, and that this, when burned along with the rest, might form a good basis for an attack upon the gas company. On the other hand, managers of such companies, who are straining all that is in them to effect economies in production and distribution, as well as increasing the sales of their product, might well consider an improvement in manufacture which, while it might add perhaps 1 cent per 1,000 cubic feet to the cost of the article as made at present, would at the same time enable them to save really 5 or more cents per 1,000 cubic feet of gas, by reason of the improved process enabling them to buy and use a much cheaper grade of material, not now available because of the excessive, with present methods prohibitive, quantities of sulphur contained therein. It seems to me that it does not require the wisdom of a Solon or a Solomon to see the points outlined in the above.

It has been a habit with the writer for many years to examine the "Official Gazette" of the U. S. Patent Office, to keep in touch with inventions of interest to our profession, and when he came across a certain patent in whieh the inventor proposed to re-heat the manufactured and already purified gas—that is to say, purified in the old and well-known manner—in order that the sulphur which remained and could not be taken out by the same, would be converted into a removable substance and then taken out, he, like others perhaps, mentally pooh-pooh's the idea at the time as introducing useless complications. On examining it, though, later on, and laying it aside, added still another block to that pavement mentioned before, which is said to be composed as the reader knows of neglected "good resolutions." At last, here at Portland, the writer came face-to-face, as it were, with this forgotten proposition, saw it in operation upon a decidedly large scale, and learned it had thus been operated for a number of years, very profitably to the local gas company.

The simplicity of operation, accuracy in chemical perfection of results obtained, and that these are extremely profitable to the operating company, as well assatisfactory to gas consumers, cannot be doubted by anyone competent to comprehend this really important improvement in gas manufacture, and who has taken the trouble to see, or critically, thoroughly and without prejudice, examine the subject.

Proverbially, it is but a step from the sublime to the ridiculous; and so, before closing, permit me to direct attention to the "Hornsey Gas Process," patent applied for, which is being exploited now throughout the country, with headquarters not far from your office. The old "Chamberlain Process," the notorious, at one time, "Harris" and other schemes of a later date, to get the money of an innocent, confiding, investing public, and instrumental in casting disrepute upon an honorable industry, were scarcely as absolutely silly, though described in plausible (to the non-professional) language, as the "process" mentioned appears to be.

The readers of the American Gas Light Journal might do well to keep an eye on this latest of wonders, in the line of improved methods of making gas. When I tell you that these lines are being written in a city decorated for a festival occasion, in a beautiful and lavish manner, such as was not surpassed, if equalled, by the best seen at the late Hudson-Fulton celebration at New York, with bands of music parading up and down, the thoroughly splendid display manifested in all the business and many residential streets, you may realize that the fourth annual "Rose Festival," from the 6th to the 11th insts, is on. Beautiful, indeed, it all is, worth the travail of many thousands of miles of travel to witness.

A Reinforced Concrete Gasholder Tank.

The *Gas World* reports that at a district meeting of the Incorporated Association of Municipal and County Engineers was held at Leigh-on-Sea, England, June 2, Mr. Chas. F. Hunt, Assistant Surveyor, read a paper describing extensions at the Leigh-on-Sea gas works, with special reference to a reinforced concrete gasholder tank. Owing to the site being impregnated with salt water, a steel tank would have had to be protected by concrete, and as the cost of this would have been very high, it was decided, on the recommendation of the surveyor (Mr. J. W. Liversedge), to put in a reinforced concrete tank. The tank is 64 feet diameter by 29 feet 6 inches deep. The maximum stress allowed on the steel is 11 tons per square inch, disregarding the inward earth pressure. This disregard of earth pressure was advisable, because in any future extensions the removal of the earth support from at least part of the tank wall will, in all probability, be unavoidable.

A foundation slab of 3 to 1 Thames ballast concrete, 12 inches thick, is laid over the site of the tank to within 7 inches of the inside face, to distribute the weight evenly, and to provide a firm, clean surface on which to lay the reinforced floor slab, which is 6 inches thick. The weight of the wall and main and secondary columns is carried by a circular beam, 2 feet 3 inches wide by 1 foot 6 inches deep, which is reinforced by three ¾-inch rods. The wall itself is 8 inches thick at the base, and tapers to 4½ inches thick at the top, immediately under the balcony. The reinforcement consists of ¾-inch bars spaced from 2½ inches center to center at the bottom to 3¼ inches at 17 feet 6 inches above floor level. Above this height ½-inch bars spaced from 2¾ inches to 6 inches are used. For the whole height of wall, vertical ½-inch rods are used at 12 inches center to center. The ¾-inch bars have 4 feet lap and the ½-inch bars 3 feet lap.

The main columns, of which there are nine, carry the standards to the guide framing. At the top (for the purpose of giving room for holding down bolts) they are set out with the vertical rods 19 inches center to center radially, and 15 inches circumferentially. The columns are vertical down to the ground line, below which they taper both ways, to 12 inches by 8 inches immediately above the circular foundation beam. The reinforcing rods are 1 inch, and one pair is shaped and turned outward to form a shoe to spread the load over a greater area of ground.

The secondary columns, of which there are eighteen, are placed to correspond with the channel guides, which are fixed to the inside face of the tank, thus materially stiffening the tank wall at these places. These secondary columns project 12 inches from outer face of tank, and are reinforced by two ¾-inch bars. Belts of depths 6 inches and 8 inches encircle the tank at 10 feet and 20 feet approximately above floor level inside. They are reinforced by two ¾-inch and ⅝-inch bars. At the top of the tank a balcony, with a projection of 18 inches, is constructed, reinforced with ¾-inch bars, and is widened at main

columns where the guide frame standards will be fixed. Stirrup irons are fixed in belts and balcony 12 inches center to center.

In the floor are beams which radiate from the center to the main columns. These beams are 9 inches wide by 12 inches deep, and are reinforced by two ¾-inch bars and stirrups fixed 12 inches apart. At the center these beam rods are tied to a 1-inch ring.

The valve chamber is constructed with walls 8 inches thick at base, reducing to 4½ inches at ground level. The chief point of interest is the thickening of the tank wall by 4 inches, and the provision of ½-inch bars at distances varying from 4 inches to 5 inches center to center. This will resist any tendency of the tank wall to act as a beam instead of as a boiler shell, between the rigid abutments of the tank wall.

The cement used in the work was "Ferrocrete." For the first portion of the work, where quickness was a consideration, owing to the wet weather and the nature of the ground, a quick setting kind was used, but later a slower cement was adopted. The special feature of this cement is its soundness, for, as the name indicates, it is made primarily, by the Associated Portland Cement Manufacturers, for reinforced concrete work. Some time before the work was commenced, test cylinders of various thicknesses, viz., 8 inches, 6 inches and 4 inches, were made and put under pressure from a head of water of 30 feet, and kept so for a considerable time. For a short time they sweated, but soon became bone dry.

When the work of excavation was proceeded with, the boulder clay was found at a higher level than was anticipated, and advantage was taken of this to avoid a considerable amount of excavation, by leaving a dumpling in the middle, in place of the flat bottom originally intended.

The dumpling was shaped out, and the 12-inch foundation slab was put in, formed of Thames ballest and cement, in the proportion of 5 to 1, radiating channels being left for the beams. The column bars, beam bars, and the three bars in circular beam were then put in with concrete under them. The circular beam was brought up to the level of the top of foundation slab. The floor slab and the radiating beams were then put in with ½-inch bars at 8-inch centers circumferentially and radially, imbedded in the former. These bars overlap the radial beams by about 1 foot 6 inches, thus getting a good bond between the various sections of floor slab.

The whole of the bars used were of indented steel, with an elastic limit of 22 tons, an average of three tests giving 22.29 tons per square inch.

Co-Operative Plan of Engineering Instruction, University of Pittsburgh.

The Trustees of the University of Pittsburgh have adopted a plan of co-operation, recommended by the Committee on School of Engineering, which is unique and appears to blend most satisfactorily with the engineering environment of this institution. This plan will be put into operation October 1, 1910. The following is an abstract from the report of the Committee on School of Engineering to the Board of Trustees:

"It has been a matter of common observation in connection with the educating of young men who enter the engineering activities that those who spent their vacations while at school in engineering offices and industrial establishments have been better prepared for entrance upon their life's work than their fellow students of otherwise equal abilities who devoted their time exclusively to school work. The contact with the engineering activities, even in this subordinate way, gives the student of engineering an insight into practical affairs, which not only makes him of more immediate use to his employer upon graduation from school, but also fits him to pursue his studies to better advantage while in school.

"If the student of engineering is thus benefited by such chance work as he may be able to get during vacation periods, then it is evident that he will be benefited still more by pursuing a systematic course in which the instruction in school is interspersed with suitable outside practical work.

"The technical graduate, who has taken school work only, has no adequate knowledge of the organization which makes it possible for many men of diverse employment to work together as a single unit in the accomplishment of a desired result, or the system that is necessary for tying together inter-related departments for the attainment of economic production; nor does he even know as a beginner how to apply the knowledge at school in a manner altogether satisfactory to his employer

"Because of this unpreparedness of the average technical graduate, a number of large corporations have established student apprenticeship courses for the benefit of such graduates as seek employment with them.

"The engineering schools and the companies who employ their graduates are thus working independently in their efforts to prepare young men for entrance upon their life's work. Since both school and future employer have the common aim to fit the young man for efficient service at the minimum of cost in time and money, it is evident that the best results cannot be had by independent action but by co-operation.

"The University of Pittsburgh, because of its splendid industrial environment, is most favorably situated to apply this co-operative principle to the education of young men who are preparing to enter the engineering industries. Instead of keeping the young man away from the actualities of his life's work for a period of four or more years prior to graduation, as is the general custom of engineering schools, the Committee on the School of Engineering have matured a co-operative plan whereby the student, while spending in school the amount of time usually devoted to instruction in our best engineering institutions, will work 4 terms of 3 months each in the engineering industries of the Pittsburgh district. By this plan the student gets the usual theoretical course, and in addition 12 months of practical work, all in the space of 4 years, the school work being arranged so that successive groups of students will furnish continuous service to the employer.

"As compared with the engineering student who takes the school work only, he will be the gainer in the following respects:

1. "Because of the opportunities to observe in detail the methods of production and the conduct of business, and the results of his contact with the men who are carrying on our engineering industries, he will be able to do his school work more effectively.

2. "For the same reasons, he will upon graduation be of greater use to his employer. Indeed many graduates will find good positions where they have done practical work on this co-operative plan, which they can fill satisfactorily from the start. In this regard the graduate who takes his course on the co operative plan will possess a distinct advantage over the graduate who has taken school work only.

3. "The money consideration received for this practical work will be ordinarily sufficient to meet the tuition expenses for his entire course at the University. In all cases the student of engineering will be materially benefited by thus early learning from actual experience the view point of the wage earner, and the money received will be to many students an item of no small importance.

"Courses in Civil, Mechanical, Electrical, Chemical and Sanitary Engineering are offered by the School of Engineering of the University, in all of which there is incorporated the principle of co-operation. These five courses are arranged so as to be identical for the first three terms. This permits of developing the student to a certain extent along lines which are common to all engineering before requiring him to choose the specific course he is to pursue. These first three terms are looked upon as a probationary period in the sense that the nature of the work done by any particular student during this period will determine in the judgment of the faculty whether or not he is to be advised to continue in the School of Engineering."

Work in the Engineering Industries of the Pittsburgh District.

"This work is conducted under actual commercial conditions, and covers four terms of 3 months each, distributed through the middle of the student's course at the University.

"The purpose of this work is to give the student of engineering an understanding of the conditions and methods of the practical side of the profession which he expects to follow after graduatiou. This can only be obtained by actual contact with the engineering industries, and should be acquired at the earliest possible date. The student works side by side with other employees and gets an insight into labor conditions. He has the opportunity to observe in detail the methods of carrying on engineering work and the conduct of business from the productive standpoint, and learns much of value in his formative years which cannot be had from either his professors or books.

"While the University has made special arrangements with a number of our local concerns for the benefit of its engineering students, and will co-operate with the management of the concerns in every way possible, yet the student will be considered as a direct employee of the concern. He will serve as a regular employee for six

regulation working days each week for which he will receive the regular wages of a student apprentice, and shall be expected to observe strictly the rules and regulations of the company, and shall work under existing labor laws and conditions, including those pertaining to liability for accidents.

"This industrial practice will be arranged so that the student will have an opportunity, as far as practicable, to engage in work pertaining to any phase of engineering in which he may be particularly interested.

"The student will report to the proper instructor at the University one evening each alternate week for discussion of the work being done, and at the end of the term he will receive twenty credits when a written report of his work and observations during the term has been received and accepted by the instructor in charge."

The Hydraulically Operated Elevator.[1]

The use of the plunger elevator is becoming more general every year, but there are few people who understand the method by which it is worked, and if informed that the long steel tube, which they see attached to the bottom of the elevator, which moves up with the car and apparently never reaches an end, goes as many feet in the ground as the height of the building, they generally assume that they are being told a fairy tale. Yet they must know that this long steel tube has to go somewhere when the elevator is at the bottom of the shaft, but it is hard for them to appreciate the fact that the tube or plunger sinks into a cylindrical bored cavity hundreds of feet in the ground. One man recently gave as his theory regarding the disappearance of the plunger that it was patterned after the mechanism of the telescope.

Twenty years ago the modern high speed plunger elevator of to-day, as built by the Standard Plunger Elevator Company, would have been considered an impossibility. For many years the plunger elevator was used in a primitive form in England, where it was always known as a safe and durable machine, even in its earliest type. It was also used in several cities in the United States in a primitive form, but in none of these cases was it developed to such an extent as would justify its use for high-grade service. The modern development of the elevator was begun at the Worcester Polytechnic Institute at Worcester Mass., and subsequently men who had carefully studied the subject became convinced that this type of elevator was capable of still greater development and largely increased utility, and, as a consequence, the Standard Plunger Elevator Company was formed.

This Company has improved the plunger elevator in design, workmanship, cylinder sinking apparatus and controlling mechanism, so as to place it in a position which the officers of the Company assert makes it the most efficient elevator manufactured. Fortunately, the Standard Plunger Elevator Company was able to make many improvements by which the height of travel, which had before been considered the most serious objection in the use of the plunger elevator, became merely incidental.

These plunger elevators are operated by hydraulic power, water under pressure; and in the case of large plants this power is furnished from a tank system, using a limited supply of water continuously by pumping it over and over from one tank to another. This pumping is performed either by an automatically regulated steam or electric pump, and the more economical form of elevator employed the less the cost of pumping, hence the reduction in power expenses by the use of the Standard Plunger Elevator becomes an important factor. Wherever steam is available it is always employed for the pumping, as the exhaust from the steam pump can be utilized for heating the building in the cooler months of the year, thus rendering the expense of elevator power merely nominal at that time.

In the plunger elevator the car is operated from beneath by a moving column, or plunger, of steel, finished and polished to a uniform diameter, and of a length a little greater than the travel of the car. As previously mentioned, this plunger is worked by hydraulic power; that is, it is sustained and moved by water surrounding it, and confined within a steel cylinder, the length of which is slightly greater than that of the plunger itself. There is no strain on the material beyond that which is merely nominal, owing to the fact that the cylinder and plunger are of great strength. The cylinder inclosing the plunger is absolutely tight, being closed at the bottom by a welded end and carrying at the top a stuffing box with an improved packing, through which the smooth plunger passes. The plunger makes no contact with the cylinder, being surrounded by water at all times.

Installation of a Plunger.—The installation of a plunger elevator is most interesting, and a brief description of the work will prove of value to the layman as well as the engineer. The first step is the sinking into the soil of a steel casing, or small steel caisson, which is of slightly larger diameter than the cylinder, to provide space for the reception of the cylinder itself. This caisson is sunk until solid rock is encountered, and from this point downward the rock is drilled by an improved apparatus without casing, as it is unnecessary in solid rock. In the work of sinking the cylinder there is absolutely no interference with the foundations of the building. When the hole prepared for the cylinder is completed—which must be perfectly true and plumb—the cylinder is adjusted, the plunger is placed within the cylinder, and the platform of the car is attached to it through a platen by means of a flanged joint on the plunger itself, which is also firmly keyed to the platform through the platen. A bolt or cable is also independently connected to the platform from the lower end of the plunger. It will thus be seen that the only working joint of this apparatus is at the packing in the stuffing box at the top of the cylinder, and no water passes above this level. The operation of the elevator is extremely simple.

Water under pressure passes into the cylinder, entering it at the stuffing box, and passes around the plunger through the annular space between it and the cylinder, exerting its pressure to lift the plunger and the car and sustain it solidly at all points. When the flow of water is stopped the car remains stationary, and when the water is allowed to escape from the cylinder the car descends. It will thus be seen that the car cannot fall, as the water cannot escape through the annular opening around the plunger and the stuffing box with a velocity sufficient to permit of a dangerous descent. If the cylinder should burst the car could not fall, because it would be impossible for the water to escape through the apraratus between the casing and the cylinder, which is closed at the top, with sufficient rapidity to produce such a result.

If the pipes supplying the water or the controlling valve itself were to burst, the car would be stopped in a perfectly normal manner at the lower landing by the automatic limitation stop valve directly at the cylinder. In fact, there is no possible condition which could cause a fall of the Standard plunger elevator. The man in the car operates the elevator through the controlling valve, which permits water to enter the cylinder for ascent or leave it for descent, or confine it for a stop. This valve is certain in its operation, and it governs the flow of water in such a manner as to produce smoothness and freedom from vibration or bounding, at all speeds and at every change of motion.

Method of Counterbalancing.—There is no loss of power resulting from diminution of water pressure as the elevator ascends, or from the weight of the plunger itself. By a careful method of counterbalancing, accomplished by the water within the elevator cylinder, loss of power is done away with, while in addition a counterbalancing effect is secured in the ordinary manner by a counterbalance weight, which is attached to the car by cables, the combined weight of which per foot is exactly equal to one-half the loss of buoyancy in the plunger as it ascends. The counterbalancing arrangement equalizes the lifting capacity and speed of elevator travel at all times in a manner most simple and efficient. The cables employed are of great strength, but they are subject to only slight wear, and in the oldest plunger elevators in operation to-day it has never been found necessary to renew them.

Of course, in installing these elevators to ascend nearly 300 feet, as the Standard Plunger Elevator Company is now doing, it is impossible to construct the plunger in one piece. It is made in sections of steel tubing, each section about 20 feet long, which are joined in a manner that secures an absolutely uniform column, with its strength in no way impaired at the point of junction. To accomplish this the Standard Company has devised a special joint more than equal to the strength of the steel tubing composing the plunger, which is capable of resisting cross breaking or buckling. In the actual case of the Company's elevators there has never been known a long plunger under load and in operation where any deflection of bending or buckling or deviation from the vertical has been noticeable to the eye. This shows that the material of the plunger is subject to strain only to the amount of a slight thrust, for a long plunger could be artificially deflected at its center from the vertical to an extent sufficient to cause it to touch the side of an ordinary hatchway without subj cting the material to destructive stress.

1. *Gas Journal of Canada.*

Easy to Repair.—All working parts of the apparatus connected with the elevator are directly accessible; should it be desired to renew a cylinder—which has never happened in the history of plunger elevators—such a cylinder could be easly removed from its casing and a new one substituted, as the cylinder is at the bottom of an open elevator well, with all necessary and convenient room above it for handling. This, of course, is a great advantage over the old-style elevator, where the apparatus is built into the building in such a way as to involve serious structural changes upon removal.

The maximum of economy of operation must result from the use of the plunger elevator, as it is the only direct application of power for elevator purposes. There is no loss from friction of sheaves, cables, worm gears and the multiplicity of devices used in transmitting power in other forms of elevators. The cost of repairs on a plunger elevator is light. No part of the machinery is subject to severe strain or serious deterioration from wear, and plunger elevators of the primitive type, much inferior to the modern Standard Plunger Elevator, are running daily after constant use of over 25 years, thus establishing the long life of plunger elevators from actual experience.

By actual tests the plunger elevator will raise a greater maximum weight at a higher speed than any other elevator machine with the same application of power; or it will use less power to give the same service than any other kind of elevator.

Safety of the Plunger.—In order to obtain efficient and safe elevator service at landings it is necessary that the elevator hoisting engine should be of the best and most positive type, and that the controlling apparatus should be certain in its operation under all conditions. In these respects the Standard Plunger Elevator has good reason to claim superiority, as the machine itself is most simple, and its double ported controlling valve, with its differential safety pilot valve motion, gives a control hitherto unequalled. This controlling valve is positive in its operation, under all circumstances and conditions, whether the car be at rest or in motion, or at any speed, and the value of such service is readily appreciated in view of the many serious accidents which occur at landings.

This controlling apparatus is also of great value because it permits the operator to maintain absolutely a positive control as he leaves the landing or approaches it, thus facilitating the making of an accurate landing, in which the floor of the car shall be absolutely level with the landing itself, thus avoiding minor accidents due to the falling of passengers entering or leaving the car, and also the serious waste of time incident to the employment of inferior controlling mechanism. The absence of vibration and the positive control obtained by the Standard Plunger Elevator give passengers a sense of security in high buildings which is a marked contrast to that afforded by the uncertain and bounding motion experienced in some other elevators.

In order to secure absolute safety at terminal landings, it is important that the car be properly stopped at these points independent of the operator and the regular controlling mechanism, thus obviating possibility of dangerously overrunning. A serious acci lent recently occurred at St. Louis, resulting from overrunning of a suspended elevator at the upper terminal, tearing the cables from the car and sending it to the basement. The automatic limitation stop valve of the Standard Plunger Elevator, in connection with its lever shifting device, gives a safety at terminals more satisfactory than has hitherto been obtained. Buffers are also provided, thus limiting the travel of the car at terminals independent of any valves or any other mechanism. Thus it is seen that it is impossible for an accident to occur from overrunning at the terminal landings.

The first requisite of elevator service is safety, and the most serious accident that may occur in the use of elevators is the falling of the car. It is safe to say that an elevator which has a plunger beneath to support it and cables above to counterbalance it, is free from the possibility of falling. The theory of the plunger elevator is a supported car, rather than a suspended car. The suspended car is not only liable to fall from the giving way of its suspending cables, but from the failure of numerous other portions of the suspending mechanism. In a recent accident from the falling of a passenger elevator car in an 18-story office building in Chicago, the disaster arose from the giving way of the apparatus securing the suspending mechanism inside of the machine cylinder, and inaccessible to inspection. Despite safety devices, they are generally inoperative when the cable or the suspending apparatus breaks.

MR. ANDREW F. HEALY has been appointed to succeed Mr. Fred. C. Stocks as an inspector in the gas section of the lighting department of the public service, Holyoke, Mass.

A Precision Instrument Company.

As a sequel to the recent visit to Detroit (*en route* he paid a visit to the offices of the JOURNAL) of M. Jacques Abady, leading Director in the English Precision Instrument Company, of Alexander Wright & Co., Ltd., there will be established in Detroit a Precision Instrument Company, which it is expected will speedily grow to the dimensions of the Burroughs Adding Company, also a potent factor in the business life of Detroit. The Detroit Company has been incorporated under the name of the Precision Instrument Company, to manufacture and sell the instruments as licensees under the English patents. The officers selected are: President, Andrew H. Green, Jr.; Vice-President, V. F. Dewey; Secretary and Treasurer, Abram T. Baldwin; General Manager, M. Woolsey Campau. Mr. Campau was recently in New York, preparatory to sailing for England, where he will pass several educational weeks in the home works. Instruments of precision (as our readers are aware) is a term well known in modern engineering industry. The instruments are used for precisely measuring and recording variations in pressures, temperatures, etc. One type of gauge will accurately record variations in pressure within 1-10,000 of an inch water pressure, or about 1-200,000 of a pound pressure per square inch. The Detroit corporation had its inception last summer on the occasion of the visit to England of one of its officers who, being of an inquiring turn of mind, was investigating the London steam power plants for generating electricity. He found that they were using less fuel than the best American plants and traced the superior economy to the use of an instrument recording the composition of the flue gases in the boilers. England and Germany are said to be far ahead of this country in perfecting economy in manufacturing lines, for they have not our natural resources. The United States is coming to realize the value of these methods and the Precision Instrument Company believes that it has struck the psychological moment for the introduction of such apparatus. Alexander Wright & Co. was founded in 1843 by Alexander Wright, and has developed a line of 800 instruments. Mr. Wright was the inventor of the disk type of recording chart popular in this country. Mr. Abady, it is hardly necessary to add, is the author of a voluminous work on the analysis of gas well known on this side, and he and John F. Simmance, the other active Director of Wright & Co., have made many contributions to science in the form of technical papers and lectures. Mr. Abady is a member of the Westminster City Council, which governs the more important part of the area known as London, and is Chairman of the Council Committee on works. The Detroit Company has the exclusive license for the United States and Canada.

Gas Producer, Gas Engine Plants.

At the St. Louis Convention of the National Electric Light Association, Mr. Nisbet Latta, of the Allis Chalmers Company, read a paper on "The Adaptation of Gas Power for Central Station Service," in which the author sturdily advances the thought that gas producer and gas engine plants are movements in the direction toward the conservation of natural resources. As a specific case, Mr. Latta cited the great waste of energy in the Connellsville coke fields, where over 100,000 tons of coal are carbonized each day, with an equivalent waste of 50,000 tons of fuel daily. Each ton of coal carbonized is capable of producing 6,000 cubic feet of gas—that is, about 240-horse power hours. This gas might be utilized in gas engines to produce electric energy that would be distributed to the surrounding country. As another example of waste due to the inefficient use of coal, the district around Chicago is cited: 350,000 tons of coal are consumed every 24 hours in this district, and, according to the smoke inspector, the smoke in this city is estimated to damage merchandise to more than $50,000,000 a year. It also increases the lighting bill more than $75,000 a day. All of these smoke nuisances could be practically eliminated by the use of gas producers. The methods used for smoke prevention in steam boilers are not economical of fuel, and usually involve considerable expense Mr. Latta next took up the economies of the gas engine equipment as compared with steam, and as a specific example compared a 1,000-kw. gas producer gas engine plant with a non-condensing compound steam engine and boiler plant.

These conclusions show a gross saving in operation of 20 per cent. in favor of the gas engine. The life of the gas engine plant is assumed to be the same as that of the steam engine plant. The saving in operation naturally depends principally upon the cost of fuel and

the load factor. For a 100 per cent. load factor, the author shows that in this specific case gas and steam plants are about equal when coal costs $2 a ton; at 75 per cent. load factor they are equal when coal costs a little less than $3 a ton, and at 50 per cent. load factor equality occurs with coal at $5 per ton.

GAS PRODUCER, GAS ENGINE, CENTRAL STATIONS.

The gas engine committee, under the chairmanship of Mr. I. E. Moultrop, of the Boston Edison Company, confined its report this year principally to medium and small sized installations which are using gas producers, or running on illuminating or natural gas. The results of inquiries made by it show that comparatively few installations use other fuel than producer gas. Illuminating gas, while well suited for gas engine work, costs too much to be an economical fuel. The committee also collected statistics from a large number of isolated and industrial plants which are operated by gas engines. It was also stated that accurate data on the operating costs of gas engine plants have been collected and are now in the hands of the executive committee, but not printed in the report. One of the most important developments during the year is the utilization of lignite fuels in gas producers. Heretofore this fuel has been unavailable for energy production, as it cannot be burned in boiler furnaces. Inquiries to the gas engine manufacturers show that there has been no radical change in the design of gas engines during the year.

The statistics submitted in the report are compiled in four tables. Table 1 gives a list of producer plants of 50-horse power and over in which the gas engine is not the product of the manufacturer of the producer. The items listed are: The producer manufacturing company, name and location of operating company, rating of gas engine, rating of the plant, use to which the energy is put, kind of gas used and kind of fuel used in the producer. Table 2 includes the same items, except that the gas engine manufacturers are listed and the data are given for stations of 50-horse power and over in which the producer is not the product of the manufacturer of the gas engine. Table 3 covers the same ground as the foregoing tables, but both gas engine and producer are the product of the same manufacturer. Table 4 gives a list of plants installed by various manufacturing companies, giving the name and address of the operating company, rating of the plant, use to which the energy is put and the kind of fuel used.

Discussion.

The two gas engine papers were presented in succession and discussed jointly. Mr. Edwin D. Dreyfus averred that the first example in the United States of the generation of electrical energy from the waste gases of coke ovens was to be found near Lebanon, Pa., where the energy is transmitted for 10 miles. He declared that the characteristics and possibilities of the low pressure steam turbine had not been fairly presented by Mr. Latta.

Mr. H. W. Peck claimed that observations in Rochester, N. Y., had showed that gas engines are more costly than central station service when used under isolated plant conditions.

Mr. C. Stone believed that the cost of maintenance of gas engines was much higher than that stated by Mr. Latta.

Mr. Edward J. Condeu narrated the experiences of the Harvard (Ills.) Light and Power Company with a 250-kw. gas producer plant. This plant cost $150 per horse power instead of $75 per horse power as the Company was led to believe would be the cost. The cost of water alone for the plant amounts to $112 per month. He thought that the depreciation was at least twice that of an equivalent steam plant.

The "Rota" Gas Flow Meter.

The *Gas World* notes that under the name of the "Rota" meter a peculiar measuring instrument has been put upon the market, which has been examined at the German Gas Association's testing station, Carlsruhe. It indicates the velocity of flow, the number of liters per hour, and it, therefore, resembles an ampere meter in electrical work. The instrument consists of a vertical graduated glass tube, slightly conical (expanding upwards), through which the gas ascends, and as it passes up supports a light float, cylindrical in its upper part, and terminating below in a sharp point. The float is so constructed that the passage of the gas sets it in rotation, and this keeps it vertical and prevents it from catching in the sides of the tube. The instrument is either arbitrarily graduated to numbers of liters per hour, or to millimeters with an accompanying table to give the corresponding number of liters per hour. The float has a white screw-line on it, which shows plainly whether the float is rotating freely.

The testing station reports that the readings are quite accurate. The following points have, however, to be noted. The readings depend on the specific gravity of the gas; the float takes a position at which the local fall of pressure, as the gas passes the float, is just sufficient to balance the weight of the float, and a heavier gas would need a greater free cross section for this, so that the float would stand higher. With a lighter gas the float will stand lower; and, generally, the effective passage of gas is proportional to the square root of its specific gravity. Thus, if the instrument is set for gas of specific gravity = 0.445 and we use it with gas of specific gravity = 0.400, a given position of the float, say at "100 liters," will mean not 100, but $100 \times \sqrt{0.400/0.445} = 95$ liters of gas actually passing.

The influence of changes of temperature is due to the change induced in the specific gravity of the gas. Let the gas be at T° C., instead of 15° C., then the specific gravity is greater or less than the normal in the ratio of 288 to (273 + T); and the corresponding flow of gas past the float is greater or less in the ratio of $\sqrt{288}$ to $\sqrt{(273 + T)}$. This works out at figures which are smaller in their variations than the corresponding variations in an ordinary gas meter. Similarly, differences of pressures cause variations which are smaller than those produced in an ordinary meter. The back pressure, so far as it depends on the float, is independent of the amount of gas passing; so far as it might depend on a dust filter being used, it increases with the consumption.

The instrument may have very varied utilities. It can be promptly used to adjust the supply of gas to a particular burner or appliance; and this can be done under higher pressures than any which suit experimental gas meters. All that is needed is to check the "Rota" meter against an ordinary experimental gas meter, and then up to 6.4 inches of water the errors cannot exceed ½ per cent. In photometry the new instrument should be very time saving; a few preliminary comparisons of the instrument with the ordinary photometric gas meter, and then all that needs to be done is to turn the gas on, so as to make it lift the float to the required height. The errors that might arise from variations in specific gravity are, in practical working, very small. In the laboratory, the new meter may be used in preparing mixtures of gases in definite proportions. It may also be used for testing the regularity of working of a gas meter put in series with it; the slightest hitch in the movement of the drum is indicated by a waver in the position of the float. Further, it may be used for controlling the specific gravity of the gas. Let the gas be made to pass, under a given adjusted pressure, through a plate perforated with very fine apertures, and then through the "Rota" meter; a small difference of specific gravity will tell upon the quantity of gas passed and affect the position of the float in the "Rota" meter, which it will not be difficult to graduate for this express purpose. Again, the new meter may be used for controlling the air supply to Bunsen burners, for the rapid estimation of the cubic content of pipes, etc., for ascertaining the quantity of gas passed by mains under given works pressures, and other purposes; and as the instrument can be graduated so as to suit other gases, for example, Cl, H, N, SO_2, etc., it is thought that it may have a wide field of usefulness.

[OFFICIAL REPORT.—CONTINUED FROM PAGE 1097.]

FIFTH ANNUAL MEETING, NATURAL GAS ASSOCIATION OF AMERICA.

HELD AT OKLAHOMA CITY, OKLA., MAY 17, 18 AND 19, 1910.

SECOND DAY—MORNING SESSION, MAY 18.

The Association met at 10 o'clock A.M. After calling the meeting to order the President said: We have the pleasure this morning of having with us the Hon. D. T. Flynn, who, having kindly consented to speak to us, I now introduce to you. [Applause.]

ADDRESS BY THE HON. D. T. FLYNN.

Mr. Chairman and Gentlemen: As a citizen of Oklahoma, more particularly one of Oklahoma City, I felt, a year ago, when application was made by us that you name it as a place for holding your next meeting, as the city was composed of good fellows (nobody was eligible to your Association unless he was a good fellow), that we

were sure to have the annual meeting here. You will pardon me if' before going into some of my limited experiences in the natural gas business, I talk a little bit; first, about Oklahoma. Of course, everybody who lives here is proud of it. There are some things, though, which we don't mention, that we are not as proud of as of others; but I think the time will come when we will obliterate them, through having gone beyond the stage of experimentation. To even our citizens it will seem hardly possible, still 'tis true that, taken all in all, the new State of Oklahoma is the richest in natural resources of any of the United States. The most authentic reports obtainable place it first in many of America's products and, as to its aging as a State, history fails to offer a comparatively close second. To-day no other State offers such safe and extensive inducements for capital as does all Oklahoma. It has to-day, available but undeveloped, awaiting only the active use of capital, 7,000 square miles of land underlaid with coal of the best quality. Although Pennsylvania, West Virginia and Ohio are great in the production of petroleum, Oklahoma exceeds the three combined. It also has the deepest and the shallowest oil well in the world.

In the item of grand prairie, Oklahoma equals Illinois, and is generally considered a "Prairie State;" therefore, you will be surprised to learn that we have more timber in this State that can be found in the combined States of Wisconsin, Michigan and Indiana. Then, you are often told of the granite quarries of Vermont, New Hampshire and Maine, but when we tell you that the geological men say that Oklahoma, within her borders, has more and finer granite than can be found in those three put together, you are again startled, even to wondering what we have next.

Well, we are now talking of quarries, and, as marble is of great importance, we find that Nevada, New Hampshire and Massachusetts are considered leaders in its productions; but, again, find our State surpasses all these taken together. Although slightly developed as yet, we are fourth in the output of kaolin, one of the best fireproof materials known to science to-day. Oklahoma has more magnesia and dolomite rock than can be found in all of the States of the Union taken together, all of which seems wouderful, almost even too big to accept at one dose; but if you will take time and pains to investigate, you will not only find as correct in these statements, but you will also learn of many more ways in which Oklahoma leads. However, we have not yet finished our list. As to Portland cement, we stand second in its manufacture, and that industry is hardly started. Colorado excepted, we have more rivers with natural drainage than any other State, so far as capacity is concerned. It stands fourth in its stream fish-products, and leads the word in briny streams, having the only river whose water is salty for more than 200 miles in length. Admitting we stand twentieth as the the production of cotton, yet we are second in its productions from a monetary standpoint.

Oklahoma has more wheat land than either of the Dakotas, more fruit lands than California and, though away down in the list as to the acreage, we are tenth in orchard products, second as to the cantaloupe, third as to watermelons, first in tonnage and third in money value of alfalfa, and we produce a sufficient quantity of foodstuff to supply any other three States in the Union, while at the same time we purchase more commodities from out of the State, population considered, than any other State. Aside from California, it has the most healthful climate of any and is the only State where smallpox never reaches a pestilential stage. This disease in Oklahoma has no frightful feature in this, as in other States.

Since 1907 Oklahoma has excelled in growth any other State, has more cities that have doubled in population than did any other State or territory in the history of our Nation. Oklahoma is unquestionably the best State ever admitted to the Union, and although it is advancing the fastest, still it is a lamentable fact that her farmers underestimate the value of their holdings at least 90 per cent. It makes no difference what price you get for your farm, there is no other place in this or any other country where you can take the price received and purchase better land, all things considered. I desire to refer to that, first, in order to give those of you who have not become residents of our State some idea of its possibilities. In area we equal the combined area of the States of Ohio and Indiana. It was the custom of the general government, years ago, for the purpose of offering an inducement, to say to a man, "If you will go West, if you will leave the badges of civilization and if you will take it all and go out on the prairies, we will give you 160 acres of land." The invitation was accepted. Beginning with the State of Ohio, from there to the Rocky Mountains, thence to the Pacific Coast, on the North, including Alaska to the British Possessions, this government of ours said, as an inducement to develop the country, "We will give you 160 acres." I used to say, when I was in politics, that the government used to say to a fellow who wanted to come West, "I will bet you 160 acres of land you can't live there 5 years," and if they did they could have a patent for the land. Now, that is the difference between the pioneer who developed the country and the man who developed the gas and oil industry. The homesteader on the claim took no more desperate chances than did and does the man to-day who pioneers in the oil and the gas business, and who puts his last 5 or 10 thousand dollars into the hole and then discovers, when he gets through, that all he has found is a duster. Your experience in Oklahoma—I will include in that description Indian Territory—has not been very inviting. I remember well, at 3 o'clock A.M., at Tulsa, I said to a friend of mine, "What in thunder are you doing here?" He said, "I am getting oil leases and gas leases." I asked, "How are you getting along?" He replied, "I started in 3 months ago and got 12,000 acres. I complied with the rules and regulations, but just as everything was properly fixed I found there was a new set of rules and regulations." He said, "I paid $5,000 to the parties who have this land for these leases, in addition to agreeing to pay the royalty," and that he feared to get any more leases or put any more money in. Finally it dwindled down to 5,000 acres, and I started to Muskogee (the papers were on the way to Washington) when another new set of rules and regulations were promulgated that knocked me out again. I said, "Well; how are you getting along now?" He said, "That is what I am over here for. I have a prospect of signing up for 1,200 more acres, but by goodness I am afraid of another set of rules and regulations." I don't think it is necessary for me to explain to you how I happened to be up at 3 o'clock in the morning with an oil man and a gas man. However, that was before prohibition had gone into effect. [Laughter.] The homesteader was given 160 acres, and if he hung it out he got a deed for it. You come out into the country to find somebody else has the land and you pay for the privilege of trying to do business with him, which the homesteader never had to encounter. When you accomplish that, then you agree to pay a royalty, if you strike it, which is well and good; but if you don't you are worse off than the homesteader was, because he still has his land, even if a drouth strikes him. Of course, he is more fortunate, for he can return to his wife's relations; but if he doesn't have any such he has the land that he can stay on, anyhow. You people haven't had that privilege. I think no other class of people, either in Oklahoma or anywhere else, have had to take more 16 to 1 shots than have the oil and the gas men. [Applause.]

Mr. Flynn then recounted, in a very humorous vein, some of his many experiences in the gas business, especially in getting the Oklahoma Gas and Electric Company (of which he is now the President) established, and his remarks were frequently interrupted by laughter and applause. He recounted experiences of the gas and oil men with proposed legislation in Oklahoma, and continued:

I think the gas men and oil men in Oklahoma ought to begin to realize that, if they want protection from the demagogue, both in the legislature and out, they have got to give some attention to their own business on top of the ground as well as underneath. [Great applause.] We hear a great deal nowadays about the conservation policy of the government. It will be a mighty good thing for the gas men of this State, with the numerous wells that are spouting gas turned loose into the limitless sky, if they insist upon a little bit of conservation in their own particular interests. I have tried to impress upon you, in all seriousness, to try and attend a little bit to your own business on top of the ground. I don't believe anyone in the State of Oklahoma is going to confiscate your property, but that you will go on to ultimate success, believing that in the English language there is no such word as "fail." I thank you, Mr. President and gentlemen.

Amid great applause it was moved (numerously seconded) that a vote of thanks be accorded Mr. Flynn for his able and interesting address, which motion was put and unanimously carried.

Report of Committee on Badge.

The President—Mr. Mitchell, I believe you are ready to hand in a report from the Committee on Badge?

Mr. K. M. Mitchell—Yes, sir. At the Columbus (O.) meeting a Committee was appointed to select a badge for the Association. Your Committee beg leave to report and submit herewith a sample pin or emblem for your inspection and adoption. The pin is of solid gold, 14 carats, ⅞ inch in diameter, with safety catch. The fall is convex

and of blue enamel. Upon this is North and South America in gold. A hand with torch is raised from the face of that. The pin is emblematic of our Association, which is the Natural Gas Association of America, North and South. The torch and flame are emblematic of heat and light, which are freely being shed by a Divine power. The figures 1906 denote the year our organization was formed. The name of the Association is in letters at the bottom outer edge or circle of the pin. The Committee strove to give this subject the greatest and highest conception warranted by the Society which seeks to serve and make useful this God-given product which He has so mercifully stored away for ages for man's comfort and happiness.

K. M. MITCHELL,
F. B. MUELLER, } Committee.

It was then explained in general discussion that the pin could be ordered, made ready for use, as pin, button or watch fob, at a price of about $4.25 to $4.50, if ordered in lots of 100 or more.

Mr. Sweetman—I move you that the report of the Committee be accepted and that the badge described by the Committee be designated the badge of the Association. [Seconded, adopted.]

The President—I am very sorry to announce that Mr. A. Hurlburt, who wrote a paper on

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will not be with us. He is unavoidably detained at home and Mr. Sears has kindly offered to read it to us.

[For the text of the Hurlburt paper, see JOURNAL, *ante*, p. 1133.]

Discussion.

Mr. Mettler—Three years ago, at Joplin, I called the attention of the members of this Association to the danger of putting a damper in the flue pipe. Since that time, I found I was absolutely right in my contention at that time. At such time I was like all other members of this Association. We are all looking for information along the line of experience that we can get, and to substantiate what I said at the time, regarding the putting of dampers in the flue pipes, I will call your attention to the trouble that a very good friend of mine, a Kansas City plumber (one "Eph." Dougherty), had. He installed a ring burner in a furnace, very carefully laid some firebrick around the edge to try to hold the heat there, and installed a damper in the flue pipe. His wife tried to light it once or twice, and on each occasion experienced a slight explosion which caused her to refuse to light it any more. Finally, one evening Mr. Dougherty (that was his name) came home and found his wife had been without any heat in the house for over 3 hours, and it was a cold day at that. He said, "Oh! there is no danger about that." He went to light it and found the gas valve had been left turned on. He shut it off but was afraid to light it immediately, and left it for a period of 15 minutes. He then put a lighted paper in the inside of the firebox close to where the flame would naturally come up, and turned on the gas. It instantly lifted off the entire furnace top and scared the neighborhood to death. Going out there to look at it after the explosion had taken place, I found they had a damper in the flue pipe. If the latter had not been there the gas would naturally have passed into the atmosphere. I said 3 years ago if it were necessary to check the draft in any installation, check it where the air can get into it, but leave an outlet so any unconsumed gas could get out. I have not seen a domestic installation furnace, gas stove or water heater fitted with a damper that I didn't deliberately pull out the damper, for I know it is a dangerous proposition; it cannot help being one. I would like to hear from someone else on this subject.

Mr. Sweetman—Does Mr. Mettler examine to determine whether or not the flue was stopped?

Mr. Mettler—Yes; examined it and found it altogether open.

Mr. Sweetman—Was there a hole through the center of the damper?

Mr. Mettler—A 2-inch square one. It was the latest thing in dampers. Where I found it absolutely necessary to carry some check in the vent-pipe, I took the flue-pipe out where it enters the flue and inserted a brick, so there won't be an excessive draft. That would keep any inexperienced one from turning off the damper and would check that excessive draft. We have got that figured out to a very fine point in respect of water heaters. By adding a draft in the center or top of heater, we take care of any excessive draft, at the same time keeping the flue-pipe properly dried out, so that combustion can pass off into the atmosphere.

Mr. Owens—How are you going to make the draft accommodate itself to atmospheric influences?

Mr. Mettler—Always have sufficient opening in your flue-pipe to carry off the unconsumed products of combustion. When you have the poorest draft then you are safe, and if you have too much draft up the flue-pipe you are not in danger.

Mr. Macbeth—You do not install a damper in the flue of the water heater similar to that used by the Pittsburgh Company. The burning of gas is a constant operation, and if one burns the same amount of gas whenever it is in operation, the flue takes off like amounts of combustion products; therefore, it is easy enough for anyone to adjust the flue to take care of the getting away of those fumes of combustion. However, in a furnace where you might be burning 20 feet an hour or 200 feet an hour one has a different proposition, and one must have a varied outlet. No damper, I think, should be used that can completely close the flue, because if it did it would put out the fire, and I believe that in any water heater a damper should not be put in the flue. The products of combustion from a water heater—I am not speaking of the Pittsburgh water heater, but of water heaters in general—the fumes of combustion are more dangerous than from a furnace, because the gas is turned against a comparatively cold substance and is not completely burned.

Mr. Barnes—Regarding how to control it without the damper, he speaks of having an outlet for air in the chimney to the extent that would over draft it. I fail to distinguish between the two effects; that is, using a damper to control it to a certain extent by a mechanical appliance by making it revolve. In a great many of our houses different conditions exist, owing, apparently, to what we would term excessive draft, but it is really a subject of sluggishness in our condition. To-morrow we might have a change of wind direction and our neighbor's house might turn our chimney upside down, whereas the following day we get it from the other way. He speaks of controlling it by letting in more air. It is only killing a bird in another way; you have the same effect. You cut your draft off one place and reduce your air or you make a hole in the pipe further on and check your air there instead of through your furnace, with equal effect on your furnace; and if you have the check-draft open, to allow the introduction of air through the chimney out of your cellar and in through your furnace, and turn on your gas and let it in there it would stay in your furnace just as well whether it was checked beyond the furnace by a break or hole in the pipe, in regard to the effect of it. I think a man would turn his damper. Where one uses a damper in the pipe I would think one would naturally open up the damper before starting fire in it. I would make sure that the damper was open first. If I had closed my valve I would open my damper and wait awhile; but I wouldn't leave the damper closed and do so. In regard to the opposite condition, as Mr. Macbeth states, the comparison isn't at all the right one, and the one we should take into account, because a water heater works under entirely different conditions from a furnace. The latter must be suitable to yield to the variable conditions. It may not be turned just to a certain point and left that way. It must be regulated, and the solution of the entire matter is to intelligently place a flue damper that will always give some circulation; but still you must have (and to get the best results you are bound to have) control of your air as well as control of your gas valve, and as they must be adjusted, either directly or indirectly, I fail to find out the difference. A water heater is a different proposition.

Mr. Macbeth—I would like to take exception to Mr. Barnes' remark, and that it does not make any difference whether the air is checked in the inlet or outlet or flue. It does make a difference, for if the air is checked in the flue, and it is too close, the products of combustion will gather and put out the fire, but that wouldn't happen if the check was under the grate and in the air inlet. In other words, if you burn up a lot of gas the products from which couldn't get out, the fire would be put out in the furnace. That has happened on many occasions.

Mr. Welch—I didn't fully grasp the point that Mr. Barnes intended to bring out in the first part of his remarks, but I think there is a vast difference between avoiding gases after combustion and checking the gas and the air before the combustion takes place. You want a certain amount of heat in your furnace. To do that you want to burn the minimum amount of gas, and to properly and economically burn that minimum amount of gas, you want to introduce the minimum amount of air. You can't check your air except by having it adjusted correctly. The conditions of ventilation and of flue have nothing to do with the question of combustion; these are entirely a separate matter. Your atmospheric conditions are not as heavy and the draft is not as wide open in your flue, and when your air is dry, and other conditions are good, the result of a good

draft is shown. I think it makes a great deal of difference, and there is a great deal of difference between the two. I believe there should be a damper in all cases, especially with large furnaces; but I further believe, in a small stove piped to a flue in a room, that a damper is unnecessary, because the same conditions always exist, or with some slight modifications.

Mr. Jarvis—Mr. Mettler is right over his directions respecting carefulness. I have been often called on the damper question only to find a closed damper. I have had it happen many a time, and I have had to find out how I could remedy that condition. I get a damper and bend it so when it closes one way it opens the other. Then you have an absolutely certain one; it is automatic. You do not have to take down the flue pipe to get the damper in. You can bend it and get it in the flue draft, in that way giving you absolute control of your flue pipe damper. If your damper is loose enough that the draft will control, it is just the same whichever way the damper swings. Just bend it a little, and keep on bending until you get it the proper size. Then you have good control of it.

The President—As I understand it, you bend it in sort of S-shape?

Mr. Jarvis—Yes; just bend it to leave one side open enough to take care of the odor; then, if one shuts the other opens.

The President—Why not run a hole in the center? I don't see any use of a damper of that kind, for the simple reason, from the way Mr. Jarvis states the proposition, you don't accomplish anything in turning the damper, since you open it every time you close it.

Mr. Jarvis—I have found dampers having holes that wouldn't check at all. You can't limit the hole in a damper to cover the conditions in all flues, but you can this other way.

Mr. Barnes—I referred to undertaking control after everything left the furnace, not interfering in any way with that which is left. The point I wanted to get at is not to interfere with the mixer or anything in the air until after combustion had taken place; what the effect would be, after the combustion had taken place, of introducing the air beyond the combustible chamber or in it.

Mr. Sweetman—I have an ordinary damper in my furnace, and I have taught my boy (he is only 9 years old) when in the cellar starting the furnace to light a match and hold it in front of the door at the small crevice and see whether the draft is going out or coming in. I have instructed him that in mild weather the ordinary damper can be shut off some, but that in cold weather, on a large consumption, the damper must be opened wider. I have had him come to me and say, "Papa, I opened the damper a little bit, I put a match up there and it blew it out." If you can teach a 9-year old boy I should think a man or woman of average intelligence could handle an ordinary damper, and a damper should be in the flue.

Mr. J. P. Strickler—As a gas man, I can't say I would advise not to put in a damper. My idea is that each separate installation should be studied by itself; perhaps in no two houses should the installation be identically the same. Location of furnace and draft from it, and location of flue in relation to the house adjoining it, are all things that should be taken into consideration. One day the wind direction will interfere with your drafts, but the next day, when coming from the other direction, you will have a good draft. All those things and more should be taken into consideration. I would not advise anybody to put in a house an installation of any sort without a damper.

Mr. Mettler—This is such an important subject to my mind that I can't stop here at all. I want to refer you here to Sketch "C" in Mr. Hurlburt's paper. If I were putting in an installation in a furnace, that would be the kind that I would install. I would close that off entirely so no air could get into the furnace save through the air mixer. I would see to it there was no excessive draft in the flue pipe, but that it had an opening large enough to carry off any draft that was made by the heat of combustion. I would also see there was no draft into this flue pipe through the furnace, and then when I lighted my furnace it would create a heat. There should not be any more draft pulling that heat out than what the heat itself creates. There is where you begin to get economy out of the gas. There are too many of these furnace installations in which the flue or draft pulls the heat out or hauls the cold air in at the bottom of the furnace, that actually cools off the furnace or the heat that is created by the burners—actually cools it off. The only air to get in it should be that which mixes. If there is excessive draft in your flue there should be a hole cut in below it. There is a certain amount of water in each cubic foot of gas, and that is one of the features to be guarded against. In the flues of any old mansion, that water dampens the brick and plaster naturally falls down. I have gone through many a flue pipe to find the entire thing saturated with moisture, and I have had the pleasure (?) of taking 2 barrels of old ashes out of that flue pipe that had stuck on its sides for a number of years. The water in the gas caused it to break loose and fall to the bottom. You have the wrong idea if you think you have to pull your air up through the furnace. No air should go in except what goes through the mixer, and you get real economy out of it, and the only draft necessary is that naturally created by the gas or heat itself. The excess gas and fumes, if any, must be carried off, of course, but you don't want anything in your flue pipe that would hinder its passing off, and still you do not want to pull any air in that would cool off the heat created by the burning of the gas itself. I hope I make myself plain regarding that. The President in his address speaks about there having to be better piping arrangements or the price of gas is going up. A thing to which we have to come is to better the conditions under which these furnace installations are made. There are lots of them in Kansas City, and the majority of them cause too big a gas bill. I have several friends whose heating plans I looked over and then changed their arrangement by closing up the draft pipe so that air could get in only through the air mixer at its bottom, and it was done with very economical results. [Applause.]

Mr. Owens—Another point to which it seems to me we ought to give a little attention, but to which the Association hasn't paid much thought, is the question of the quantity of gas demanded for different installations. For instance, say a 6-room house. Is there any rule by which you can arrive at the amount of gas you will need to heat the house? Three considerations enter into it; the size of pipe to be used; the sort of burner to be used in making the installation or the size of the stove; and the size of the meter to be installed. I would like to have some information respecting these things.

Mr. Barnes—I don't see how it would be at all possible to arrive at any conclusion as to the size of the installation or amount of heat required to heat a 6-room house. It seems to me there would be a vast difference in houses.

Mr. Strickler—The size of the room would have a great deal to do with it.

Mr. Barnes—Say the same room, 14 by 14.

Mr. Sears—You cannot regulate it at all, as the arrangement of your room wouldn't be the same.

Mr. Bell—I believe the only way a person can determine what to put in for a customer is to study what kind of a family he has and how he lives. Although in the business about 25 years, the oftener I look at a man the more I find out about him, even to telling how much gas he is going to use in a house, whether it is a 10 or 3-room building. I have had a great deal of experience. I always try to get the installation large enough, then I am satisfied that I will satisfy him.

Mr. Owens—I understand it is impossible to get a hard, fixed rule. That was not what I wanted. I just wanted to get the ideas the rest of the gas men of the country had in regard to that.

Mr. Mettler—One more remark with reference to the sizes of pipe and meters for a certain sized house. There were, approximately, 50,000 in Kansas City, Mo., using gas or burning it, and it was absolutely impossible to supply each house with so much for each. A thousand installations were being put in by plumbers, and it was necessary that we adopt some rule. We didn't even know how long those pipes from the meter to the furnace were to be, and that length has everything to do with the size of your pipe; so it is necessary, almost imperative, to designate the size of pipe that should be put in, so we gathered the best information we could and struck a general average.

Mr. Mitchell—I don't want to monopolize this discussion or prolong it, but I wish to take exception to what Mr. Mettler said about having no air except that which comes through the bottom of the burner. Would not that send the draft down on the burner?

Mr. Stone—At the same time, gentlemen, Mr. Mettler's idea as to the proper way to check the draft is nearly right.

The President—You will admit that, Mr. Mettler? [Laughter.]

Mr. Stone—That is, generally, very good. It is quite possible, in a large number of installations, that one may need a damper in the pipe. At the same time, it will be found that you can get a more automatic, sensitive draft by having an opening either in the chimney or in the pipe so that a small amount of air is going up the flue all the time. Some years ago in an experience with a gas appliance we found we couldn't regulate the draft of the burner accurately by means of a damper; that is, we couldn't make it sufficiently sensitive. So we put in a pipe 5 feet above the burner, and set a hood over that pipe, which procedure we found sufficient to provide what-

ever draft we wanted or needed to properly regulate it. Your damper should be an opening or check-draft in the pipe, and when the suction varies, by reason of change in the wind or atmosphere, it takes it out of the cellar, carrying it up the pipe instead of making an excessive pull on your furnace. It helps to regulate the draft and also provides plenty of air going up the chimney, which helps take the moisture outside instead of having the chimney moist and not dry. [Applause.]

The President—On account of the press of business, we will have to bring this discussion to a close.

Mr. Mitchell—Will we resume it to-morrow? It is of considerable interest to all of us, and we ought to continue it.

The President—If we can get the time we will continue it.

Mr. Mitchell—I want to say that I believe, as Mr. Hurlburt said, a damper should be placed in this flue, which should, however, not completely close the stack, and, in cases of furnaces, this should be placed between the check-draft and the furnace. All consumers should be warned against flues becoming stopped up, etc. I think a damper is absolutely necessary, and I think, as Mr. Sweetman said, you want to attend to your damper judiciously, always seeing to it that the damper is at all times adjusted properly. You can't put a damper in a flue and have it remain stationary. It needs to be adjusted occasionally. I have great regard for the experience of Messrs. Stone and Strickler, and I think that Mr. Stone spoke of a disconnected flue pipe. That is all right, but it is particularly applicable to water heaters or where large amounts of gas that are being burned are not passed from the chimney, but are liable to blow down and blow the flame out. I want to call attention to another section of Mr. Hurlburt's paper, in adjusting the attaching of a hot air drum to the air furnace—an auxilliary installation for burning gas only. We have a number of these installations in operation in St. Joseph. I have one in my house where we attach a regular gas furnace to the side of the hot air furnace, don't disturb the latter in any way. We simply attach the combination furnace alongside of the jacket of the hot air furnace and, in case of low pressure or accident to the gas supply, all we have to do is simply throw coal into the regular furnace. I would call attention of gas companies to the advantage of paying attention to this and even, if necessary, spending a little money to having as many of these installed in the hot air furnaces as possible, for they are a decided advantage in case of a breakdown or a shortage in the supply of gas. I made a little sketch of the idea, showing the attachment on the side of the gas furnace. You undoubtedly have heard of it. There are various patents and designs of the idea, but I would recommend this as being a great help to the gas man.

Mr. Sinclair—I would like to ask about the heat from the gas in that arrangement?

Mr. Mitchell—It is put in the air space of the drum up near the top.

Mr. Sinclair—Radiation of the coal furnace?

Mr. Mitchell—Yes. You simply cut out a space for the heated air that comes from this auxilliary heater, and it goes right into the furnace. You don't disturb your air furnace at all.

The President—Mr. Sears, do you care to say anything to end this discussion?

Mr. Sears—I think, from what I know of the conditions in Kansas City, that there is a great deal of good information in Mr. Hurlburt's paper. I can't say I differ particularly with him on any of those points. Some things I do differ with him, but not in a really material way. I think, in fact, am quite sure, that in the main perhaps a damper is absolutely necessary, with the exception of the instantaneous heater. There I keep it out entirely.

The Secretary—That's right.

Mr. Sears—I would put in a damper, not closing it up completely, but so it would permit of carrying off the fumes. It might be well for the chimney sweats (and you will have trouble along that line) to open the flue below the chimney, as Mr. Mettler and Mr. Stone have stated, but I don't know that I can say any more to the paper. [Applause.]

(To be Continued.)

THE Danbury (Conn.) and Bethel Gas and Electric Light Company will install in its power station on Pahquioque avenue, a new steam turbine electric generator which will more than treble the electrical power capacity of the plant. Two additional 300-horse power boilers will be added to the equipment and the station will be enlarged generally.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 10 cents.

959,525. Electric Gas Lighting Apparatus. D. M. Hartford, C. M. Taylor and L. S. Stone, Los Angeles, Cal.

959,593. Gas and Air Mixer for Burners. G. A. Peterson and J. L. Lackett, Clarksburg, W. Va.

959,745. Regulator for Gas Lighting Systems. G. E. Hulse, Newark, N. J., assignor to Safety Car Heating and Lighting Company.

959,760. Incandescent Gas Burner for Inverted and Upright Incandescent Lights. F. Kratky, Vienna, Austria-Hungary.

960,086. Gas Main Stopper. P. Goodman, New York city.

960,400. Gas Heater. A. Rector, New York city, assignor to Rector Gas Lamp Company, same place.

960,533. Automatic Billing Machine for Meters. R. W. Gallagher, Los Angeles, Cal., assignor to Automatic Billing Company, same place.

960,569. Automatic Alarm and Gas Pressure Cut-Off Device. O. C. Moon, Pittsburgh, Pa.

960,630. Shade Holder for Inverted Gas Burners. S. F. Elkins, Pittsburgh, Pa., assignor to the Manufacturers' Sales Co., same place.

960,638. Inverted Incandescent Mantle. C. K. Harding, Chicago, Ills.

960,745. Gas Generator. W. A. Wallace, Seymour, Tex.

960,839. Water Gas Apparatus. F. B. Daugherty, Alexandria county, Va.

960,851. Attachment for Incandescent Lamp Mantles. R. M. Dixon, East Orange, N. J., assignor to the Safety Car Heating and Lighting Company.

961,040. Inverted Gas Burner. E. Steil, Berlin, Germany, assignor to Berlin Anhaltische Maschinenbau Actien Gesellschaft, Abteilung XII., Berlin, Germany.

Items of Interest
FROM VARIOUS LOCALITIES.

MR. G. W. PEFFLY, Sales' Agent in New York for George M. Clark & Co., informs us that Mr. E. F. Davis is no longer in the employ of the Company. His resignation was handed in the first inst., and Mr. Peffly further advises that the trade will be notified shortly as to his successor.

"F. E.," writing to the JOURNAL from Portland, Ore., under date of the 7th inst.: "The show of roses here (the festival of roses) is just glorious, and I think it is safe to say that no other gas company's office has ever been decorated with such a profusion of roses of all sizes, shades and sweet scents, or more lavishly albeit tastefully, than is now that of the Portland Gas Company, at Fifth and Yamhill streets."

MR. GEORGE ARROWSMITH, General Superintendent for the Yakima-Pasco Power Company, has assumed the active management of the gas, water and electric plants in North Yakima. His predecessor (Mr. E. Stover Tice) retires to become Secretary of the Western Auto Company.

PRESS despatches, dated the 13th inst., confirm prior intimation that a consolidation plan, which involves the connecting of 26 Illinois Valley cities, towns and villages, for the distribution of gas and electric currents from central points, has been advanced by the granting of 50-year franchises to Charles A. Monroe, of the newly organized Illinois Valley Gas and Electric Company, a subsidiary of the Commonwealth-Edison Company, of Chicago, and the Economy Light and Power Company, of Joliet. Mr. Samuel Insull is President of the 3 named concerns.

"THE New Haven (Conn.) Gas Company, is fixing up its distributing system in the adjoining territory of East Haven," writes a correspondent, who then adds: "The *Register*, of the Elm City, in commenting on or announcing this mite of news, adds: The Company deserves much praise for the manner in which it left the streets along the line where the mains were put down. The streets were

left in as good condition as before, or prior to the time these were dug up, which is something that cannot be said of other concerns that dig up the streets at various times."

THE Kelsey and Brewer Company took over the properties of the Red Wing (Minn.) Gas and Electric Company, and that they have managed the same in a business fashion would look from the fact that they have declared an initial dividend of 1 per cent. on the shares, the understanding being that an annual 4 per cent. basis is now assured.

THE Board of Control, Dayton, O., has awarded the public lighting of the city for a period of 10 years, to the local gas company, in so far as that lighting is accomplished by means of gas, at the rate of $21.85 per lamp per annum. The city fathers of Dayton evidently believe in encouraging home industries, for our correspondent who forwards the mention, remarks: "The bid of the Welsbach Street Lighting Company, of America, was lower than the one accepted, in the sum of $1 per lamp." The number of lamps to be maintained is put inside of 1,500.

SOME days ago the Auditor of Public Accounts, Springfield, Ills., issued a permit to Messrs. A. A. Bosworth, E. H. Reynolds and C. H. Whitelaw, to organize the Peoples Trust and Savings Bank, of Chicago, with a capitalization of $500,000. This institution is under control of interests identified with the Peoples Gas Light and Coke Company, of Chicago. Its offices will be in the Peoples Company's new building at Michigan and Adams streets, and Mr. Bosworth, formerly National Bank Examiner, will be its President.

MESSRS. S. J. FRANKLIN, Walter Owen, N. J. Livermore and Alfred Brandriff, of Millville, N. J., with John T. Whitcar and E. H. Whitcar, of Fairfield, N. Y., are named as the incorporators of the Fairfield (Cumberland County) Gas Company, to be operated in Fairfield, N. Y., and vicinity. The Company is capitalized in $30,000.

THE Lowell (Mass.) Gas Company was the promoter of an excellently arranged and well carried out gas cooking demonstration in the town hall of the adjoining suburb of Chelmsford, the evening of the 8th inst. Our correspondent further adds: "The attendance, which was beyond the expectations of the Company, thoroughly enjoyed the proceedings, which were both pleasurable and profitable, the auditors following with close attention Miss Webber's careful and explicit explanations respecting the menu and the preparation thereof. The gas range used was decidedly an object of interest to the audience. It gives me pleasure to add that the demonstratress (Miss Carolyn Putnam Webber) is a culinary artist who finds great favor in New England."

A CORRESPONDENT in Des Moines, Ia., who has just concluded a trip, during which quite a stay was made in Hannibal, Mo., forwards the following: "The residents of this growing, progressive center of business in Missouri (Hannibal) are much interested over the plan of General Manager A. M. Hart, of the Hannibal Gas Company, who is certainly an active man. He thus, to all intent, spoke to a friend of mine the other day: 'We are going to build a plant sufficiently large to accommodate 40,000 or 50,000 users of gas daily. We appreciate the fact that Hannibal's growth has been exceptional the last few years, and believe that the increase in population will be consistent and continued. It will be a modern plant in every sense of the word.' The Hannibal *Journal*, referring to Manager Hart—he is also the Company's Secretary—in personal mention of Mr. Hart had this to say: 'Under Mr. Hart's management the local Gas Company has prospered. It has given good, honest service and voluntarily reduced the rate of gas twice. The result is that the people of Hannibal are friendly and appreciate the efforts made by the Company in giving them the best kind of service.'"

EASTERN capitalists have about concluded the preliminaries to govern the sale and purchase of the works at Cedar Rapids, Ia. The negotiations have been mainly carried on with the Averill estate by the intending purchasers.

AT the annual meeting of the Binghamton (N. Y.) Gas Works Company the officers elected were: Directors, C. M. Stone, Geo. F. O'Neill, S. J. Hirschman, W. G. Phelps, J. W. Manier, I. T. Deyo, Geo. W. Deinn, A. P. Lathrop and Emerson McMillin; President, A. P. Lathrop; Vice-President, James W. Manier; Secretary and General Manager, C. W. Bennett; Treasurer, P. W. Manier.

THE Lynn (Mass.) *Item*, of recent date, had this to say: "Early this month the vacant store next to the National Grand Bank was the scene of much activity. The agents of the Marblehead Gas and Electric Company were busily engaged in demonstrating the fact that an up-to-date gas range is the only correct equipment for the kitchen. Women in round numbers availed themselves of the privilege of witnessing how bread, cake, pies, puddings, etc., should and could be baked, cooked, etc., to the very minute, without soiling a hand or sullying an apron. Mrs. S. C. Fisher was the demonstatress, and her methods are almost as clever as that 'Queen of them all,' Mrs. Armstrong. All about the Company's quarters could be seen, carded at prices that certainly cannot be included in the category of 'high living' sums—the high meaning in this case, cheap ranges for high livers. Cake with fruit punch was served throughout (or at proper intervals), the lectures by women attendants, and Mr. Charles H. Stevens was everywhere explaining matters and materials, and the grace with which he circularized the audience guests was irreproachable. Marblehead folks, now that the methods of the 'Man from Lynn' are pertinent in the old whaler's erstwhile dominion, are vastly interested in $1 25 per 1,000 gas and its possibilities; and it may be truthfully said that it is the desire of the Company to give its customers the very best service possible. To end this narrative, I can and do say in the surest of truth that no better lighted showroom was ever seen in the village of Marblehead, than the showroom in which these demonstrations were held."

MR. G. E. DARLINGTON, Referee in Bankruptcy, has notified us that the first meeting of the creditors of the Jacobson Gas Engine Company, of Chester, Pa., will be held in Media, Pa., at 10:30 A.M., of the 22d June.

THE authorities of Milford, Mass., have agreed upon a 3-year contract for the street lighting of that place to the Globe Gas Light Company. We believe this is the initial trial of all night service in that beautiful Massachusetts center, strange to say. The contract calls for the maintaining of 163 lamps, "from dusk to dawn, every night in the year," our informant expressively adds, at the rate of $24.50 per lamp.

THE Byllesby Company makes the announcement that when its engineers are through with the proposed reconstruction of the gas and electric lighting plants at Eugene, Ore. (properties recently acquired by the Company), the provision for the artificial lighting of the named place will be up to that of any other place in the State.

THE Clearfield (Pa.) Gas Company's old retort house site was recently sold to the B. R. & P. R. R. Of course, this meant a new retort house and the customary generating installation therein, contracts for the construction of which were awarded to the Gas Bench Construction Company, of St. Louis. President Hamlink, we understand, is proposing to take a European trip this summer. Hope he makes a "go" of it, for no other man deserves better a recreation outing.

MESSRS. HENRY L. DOHERTY & CO., of New York city, who recently purchased the properties of the Meridian (Miss.) Light and Railway Company, are now whipping into shape their latest acquisition at Bristol, Tenn. These acquirings comprise the gas and electric companies of Bristol.

THE bid of the Edison Company, of Boston, Mass., for the public lighting of the street lamps of that city, as outlined in the specifications submitted by Supt. Guy C. Emerson, was $22.31 per lamp on a year agreement, the rate to be $21.31 if the agreed on period is fixed at 10 years.

THE authorities of Marengo, Ia., have at last yielded to the applications, to say nothing of the supplications, of the Western United Gas and Electric Company, for a franchise to distribute gas in the named place. The agreement places the net selling rate at $1 per 1,000, and gives the town the right to consider the readjustment of rates at the end of 20, 30 and 40 years. Marengo has about 3,500 people, and is relatively perhaps the richest settlement in McHenry county.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

MONDAY, JUNE 20, 1910.

The Market for Gas Securities.

There is little to say respecting the course of the market in the last week, although on the whole it was less ragged than for some time back. Consolidated came in this morning (Friday) at 136 to 136¼. Rumors are plenty as to steps that the Trustees are about to take in respect of financial reorganization, but every past lesson in this matter would seem to teach letting the shares alone when they are high and getting in when they are low, for it is a certain fact that the doings of certain brokers in connection with these shares seem to be "inspired."

The general situation is unsettled, although the Massachusetts issues are reflecting good management, and Peoples, of Chicago, is also on the strong side, although still absurdly low.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

JUNE 20.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$73,177,000	100	136	136½
Central Union Gas Co.— 1st 5's, due 1928, J. & J.	3,000,000	1,000	98	101
Equitable Gas Light Co.— Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.— 1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River— 1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union— 1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	140½	142½
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106½	107
Yonkers	299,650	509	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	¾	⅞
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	509,000	1,000	90	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	73	73½
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	106½	—
Mortgages, 6's	3,600,000		89	100
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	458,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	103	103½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	101¾	101¾
Preferred	2,500,000	100	90	100
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co. " 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	82	83
Preferred	25,000,000	100	91½	92
Montreal Gas Co., Canada	3,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt & Coke Co., Chicago	25,000,000	100	106¼	106¾
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.— 1st Mtg. 5's	751,000	1,000	100	102
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	90	95
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	100	104
Washington (D. C.) Gas Co.	1,600,000	200	355	360
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	361	—

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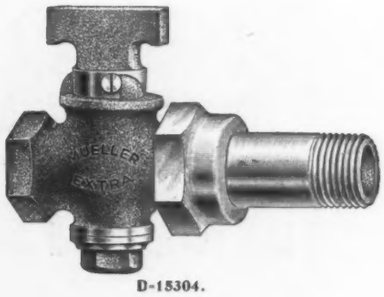
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MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October, 1910. New York City. Officers: President, Wm. H. Bradley, N. Y., City; Secretary, A. B. Beadle, 29 West 39th street, N. Y. City.

Canadian Gas Association.—Annual meeting, June, 1911. ————————. Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1910. New York City. Officers: President, C. R. Huntley, Buffalo, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Guild of Gas Managers of New England.—Annual meeting, December. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, A. K. Quinn; Newport, R. I.; Secretary, Walter G. Africa, Manchester, N. H.

Illinois Gas Association.—Annual meeting, time, March, Chicago, Ills. Officers: President, A. S. Harrington, Chicago, Ill.; Secretary-Treasurer, C. B. Strohn, Elgin, Ill.

Illuminating Engineering Society.—Annual meeting, January —, 1911. Meetings of Sections, monthly. President, W. H. Gartley, Philadelphia, Pa.; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York: Secretary, Albert J. Marshall, 227 Fulton street. New England, Secretary, L. D. Gibbs 39 Boylston street, Boston, Mass. Philadelphia, Secretary, F. N. Morton, Broad and Arch streets Chicago, Secretary, T. R. Beebe, 157 Michigan avenue,

Indiana Gas Association.—Annual meeting, January 19, 1911, Fort Wayne, Ind. Officers: President, Carl H. Graf, Indianapolis; Vice-President, S. E. Mulholland; Secretary-Treasurer, Philmer Eves, Indianapolis Gas Company, Indianapolis, Ind.

Iowa District Gas Association.—Annual meeting, time, June 15, 16, 17, 1910, Sioux City, Ia. Officers: President, Geo. H. Waring, Omaha, Neb.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ———— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association—Annual meeting, time, September, 1910; ———— Officers: President, B. O. Tippy, Grand Rapids, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April 13, 14 and 15, 1911; St. Louis, Mo. Officers: President, R. J. Irvine; Secretary and Treasurer, W. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, December, 1911: Boston. Officers: President, E. N. Wrightington, Boston; Secretary, Louis Stotz, 36 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May ————, 1911; Pittsburgh, Pa. Officers: President, John M. Garard, Secretary, T. C. Jones, Delaware, O. Editor Wrinkle Department, F. W. Stone, Ashtabula, O.

New England Gas Association.—Annual meeting, third Wednesday in February; Boston. Officers: President, W. H. Snow, Holyoke, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

Oklahoma Public Utilities Association.—Annual meeting, May 9, 10 and 11, 1911. Officers: President, E. C. Reynolds; Secretary, Galen Crow, Guthrie, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. 20, 21 and 22, 1910, Los Angeles, Cal. Officers: President, W. B. Cline, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 925 Franklin street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1911, Reading, Pa. Officers: President, J. H. Keppelman, Reading, Pa.; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, December, 1910; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 1123 Broadway, New York.

Southern Gas Association.—Annual meeting, Feb. 16, 1911, Montgomery, Ala Officers: President, H. W. Frund, Salisbury, N. C.; Secretary-Treasurer, Jas. Ferrier, Rome, Ga.

Southwestern Electrical and Gas Association.—Annual meeting, May, 1911, ———— Tex. Officers: President, W. B. Euttle, San Antonio, Tex.; Secretary, H. B. Head, Stephensville, Tex.

Wisconsin Gas Association.—Annual meeting, May ———, 1911, Milwaukee, Wis. Officers: President, W. H. Winslow, Superior, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.

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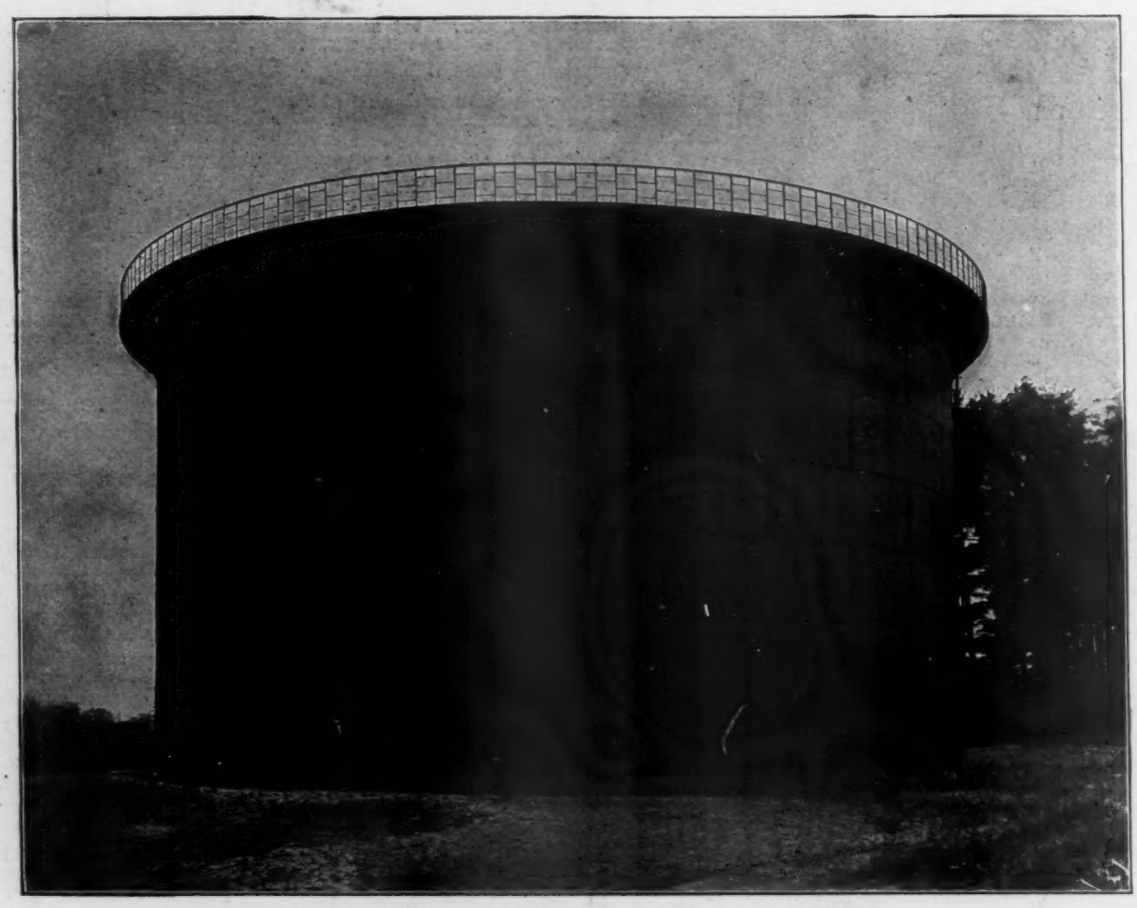

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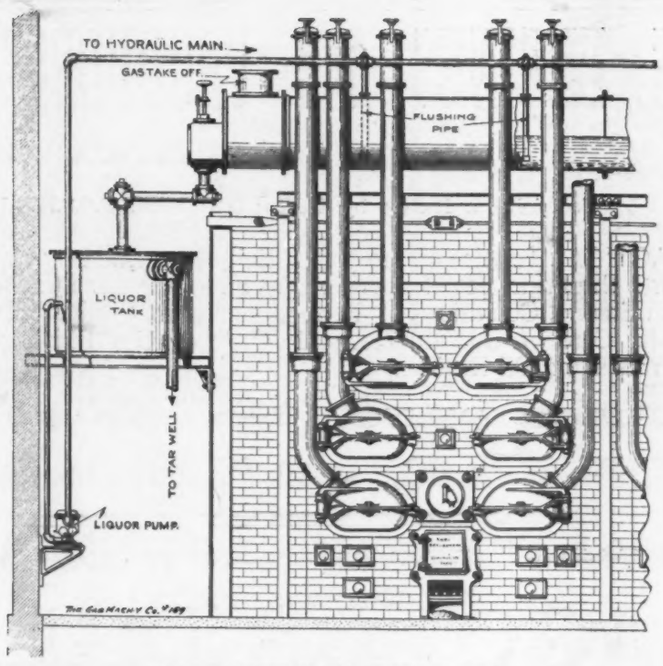

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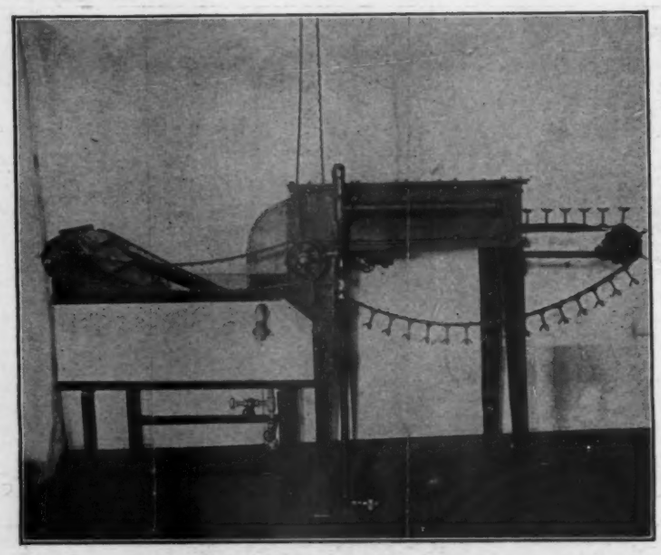

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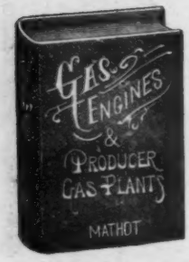

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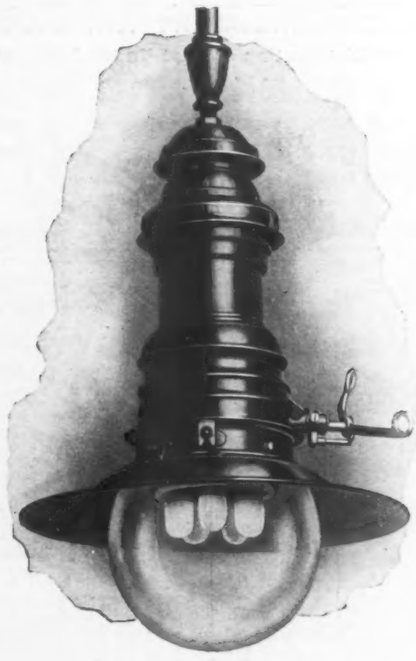

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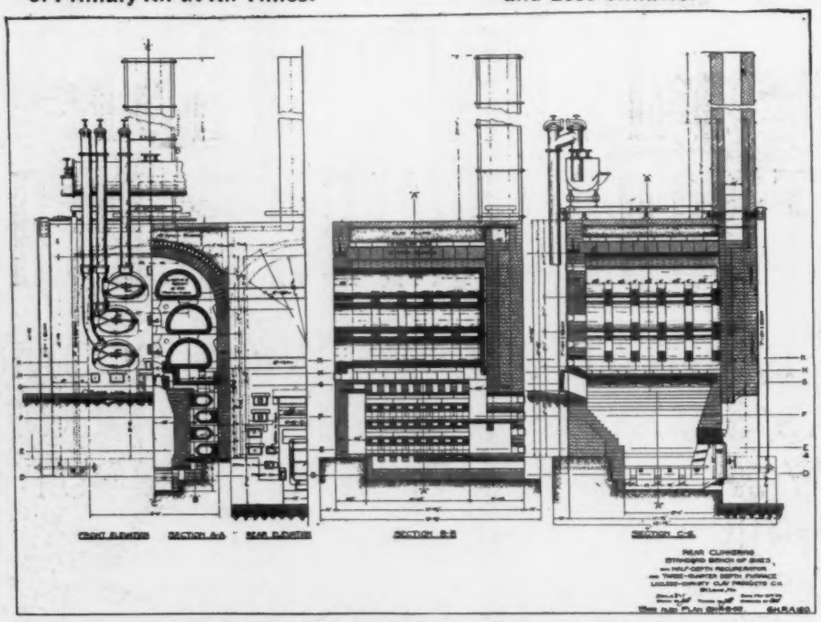

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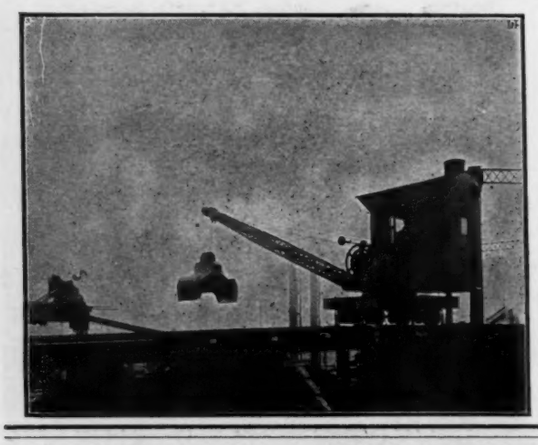

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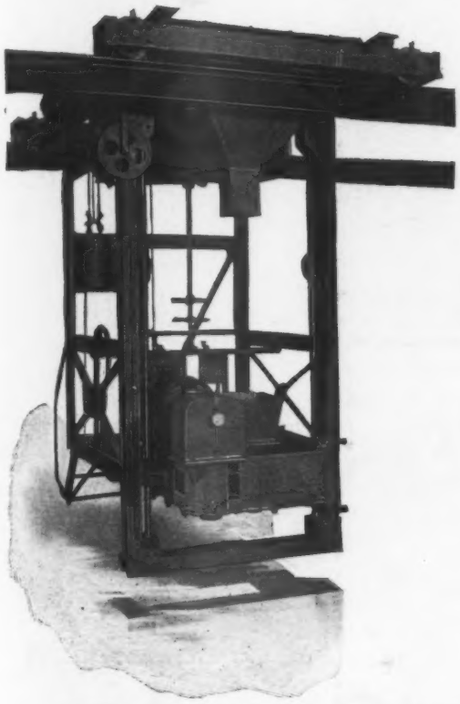

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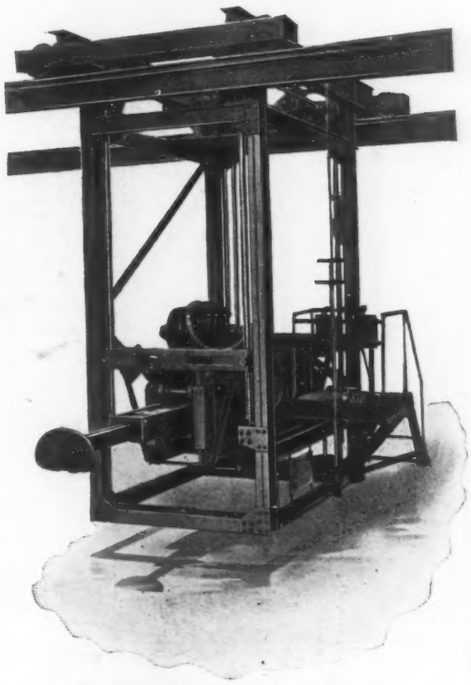

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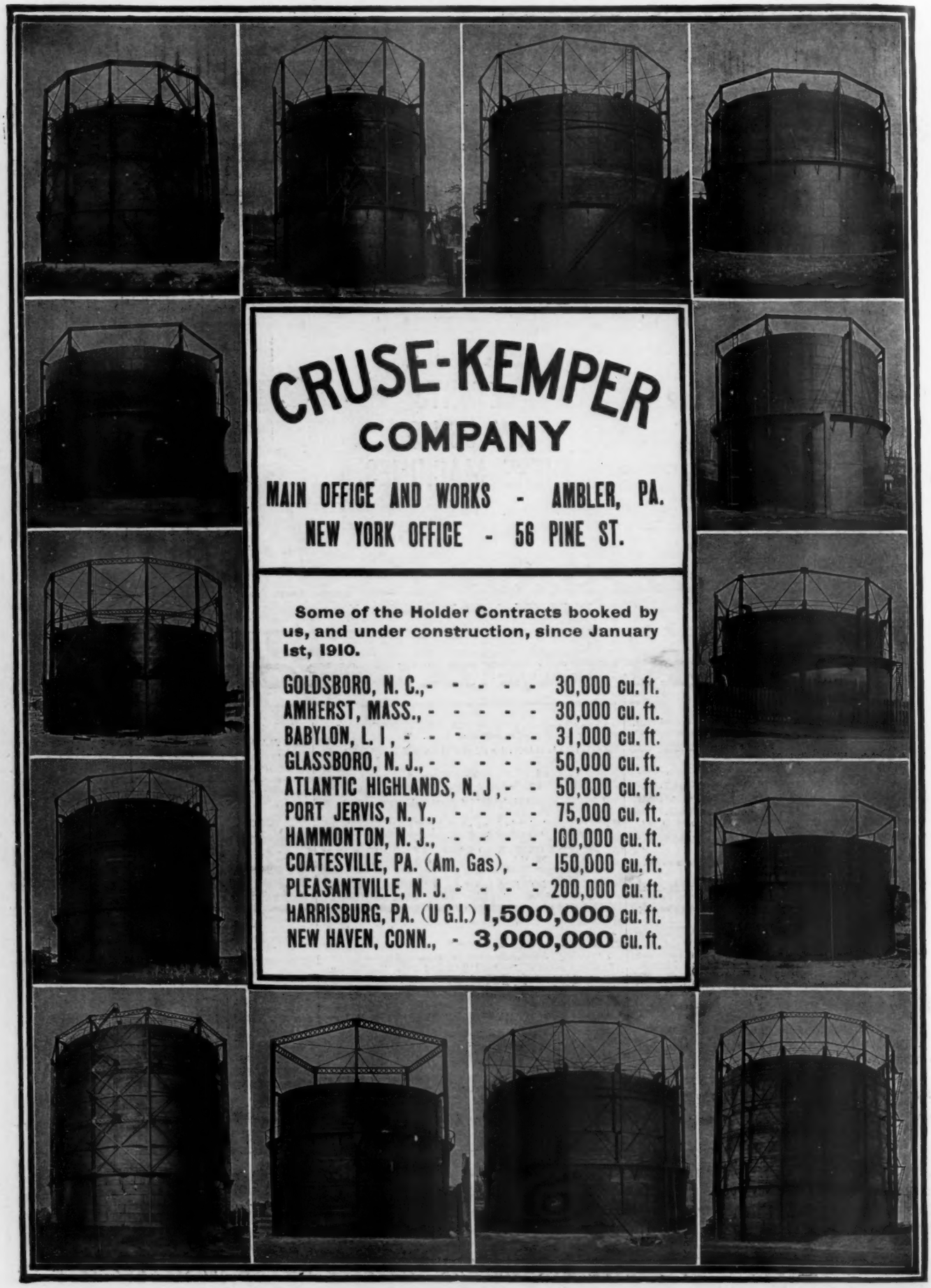
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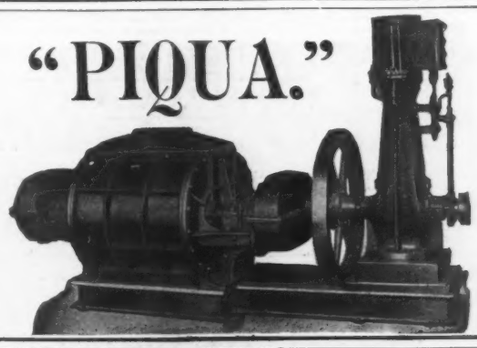

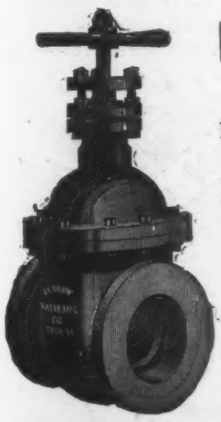

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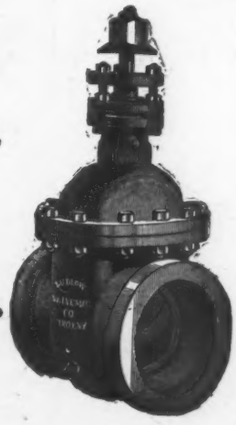

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		P.M.				P.M.	A.M.
Wed.	1	7.50	2.40 A.M.	Wed.	1	7.12	3.17
Thu.	2	7.50	3.00	Thu.	2	7.12	3.17
Fri.	3	7.50	3.30	Fri.	3	7.12	3.17
Sat.	4	7.50	3.30	Sat.	4	7.17	3.12
Sun.	5	8.00	3.30	Sun.	5	7.17	3.12
Mon.	6	8.00	3.30	Mon.	6	7.17	3.12
Tue.	7	8.00 N.M.	3.30	Tue	7	7.17	3.12
Wed.	8	8.00	3.30	Wed.	8	7.17	3.12
Thu.	9	8.00	3.30	Thu.	9	7.17	3.12
Fri.	10	8.00	3.30	Fri.	10	7.17	3.12
Sat.	11	8.00	3.30	Sat.	11	7.17	3.07
Sun.	12	11.00	3.30	Sun.	12	7.17	3.07
Mon.	13	11.30	3.30	Mon.	13	7.17	3.07
Tue.	14	11.50 F.Q.	3.30	Tue.	14	7.17	3.07
		A.M.					
Wed.	15	12.10	3.30	Wed.	15	7.17	3.07
Thu.	16	12.30	3.30	Thu.	16	7.17	3.07
Fri.	17	1.00	3.30	Fri.	17	7.17	3.07
Sat.	18	1.20	3.30	Sat.	18	7.22	3.07
Sun.	19	1.50	3.30	Sun.	19	7.22	3.07
Mon.	20	2.20	3.30	Mon.	20	7.22	3.07
Tue.	21	No L.	No L.	Tue.	21	7.22	3.07
Wed.	22	No L. F.M.	No L.	Wed.	22	7.22	3.07
Thu.	23	No L.	No L.	Thu.	23	7.22	3.07
Fri.	24	8.00 P.M.	10.30 P.M.	Fri.	24	7.22	3.07
Sat.	25	8.00	11.10	Sat.	25	7.27	3.07
Sun.	26	8.00	11.50	Sun.	26	7.27	3.07
Mon.	27	8.00	12.10 A.M.	Mon.	27	7.27	3.07
Tue.	28	8.00	12.40	Tue.	28	7.27	3.07
Wed.	29	8.00 L.Q.	1.10	Wed.	29	7.27	3.07
Thu.	30	8.00	1.30	Thu.	30	7.27	3.07

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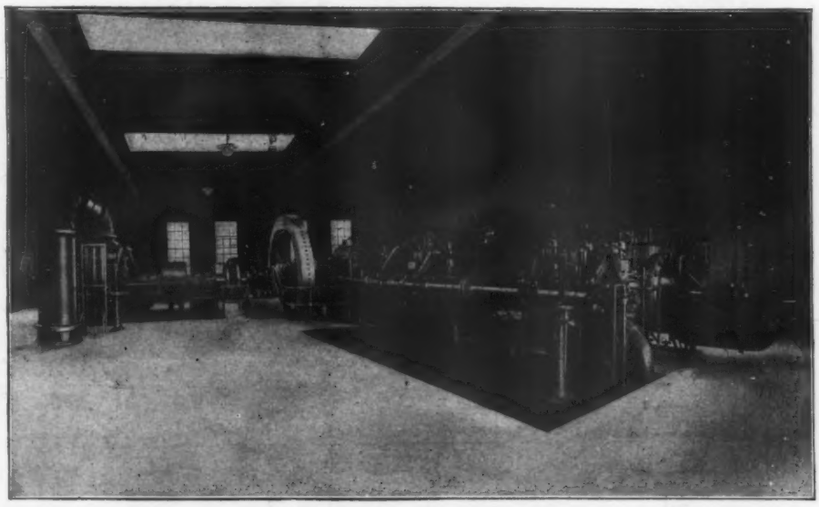

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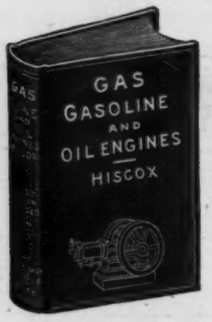

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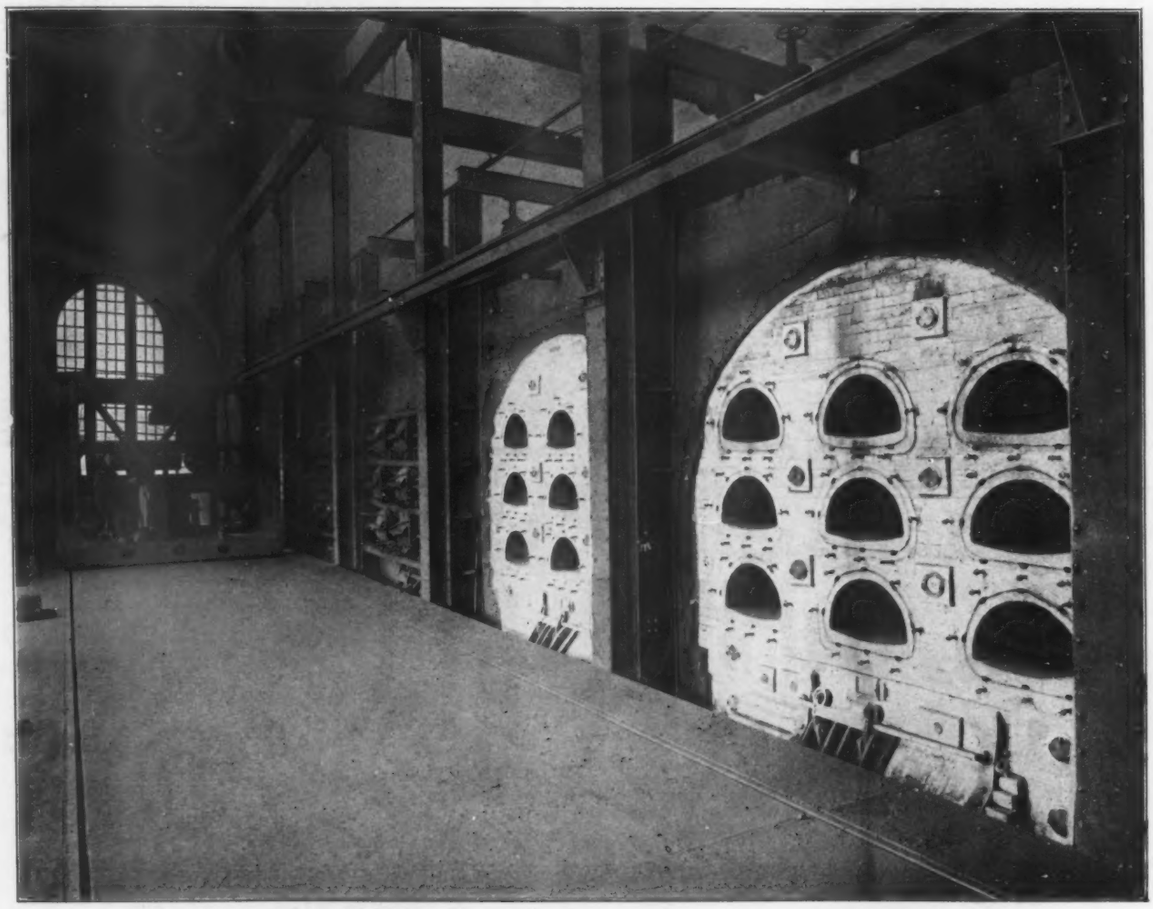

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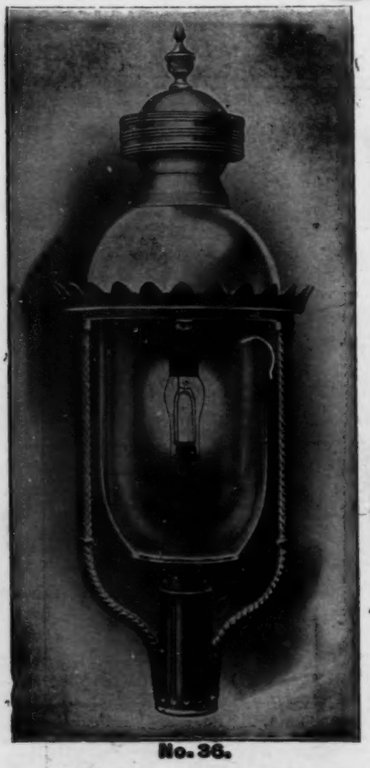

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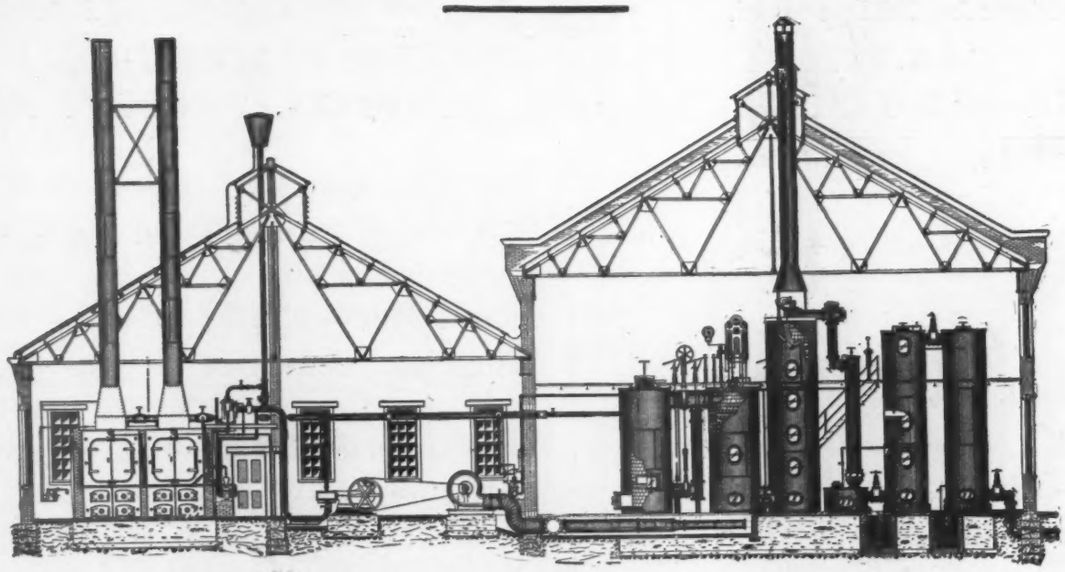

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TOTAL NUMBER OF SETS INSTALLED DURING YEAR 1909, ... 31
TOTAL NUMBER OF SETS INSTALLED TO JANUARY 1, 1910, ... 721
TOTAL DAILY CAPACITY TO JANUARY 1, 1910, ... 585,590,000 cu. ft.

Tar Extractors for Carburetted Water Gas
Photometrical Apparatus.
Gas Analysis Apparatus.
Recording Gauges.
Straight Standpipe System for Coal Gas Retorts
Straight Standpipe Cleaners.
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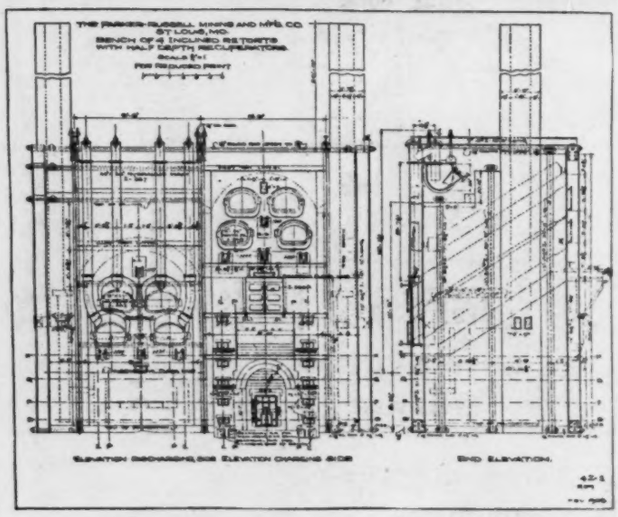

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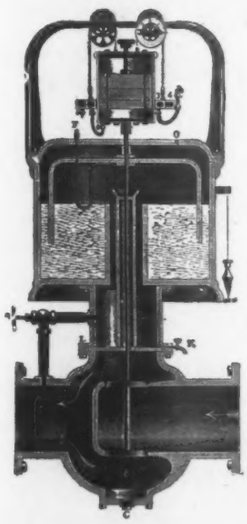

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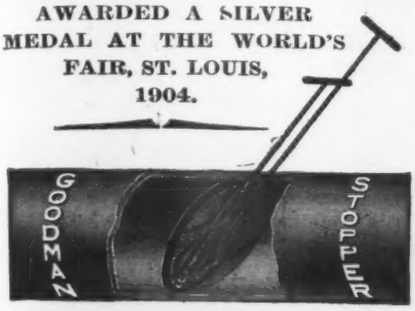

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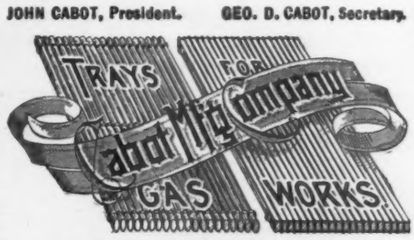

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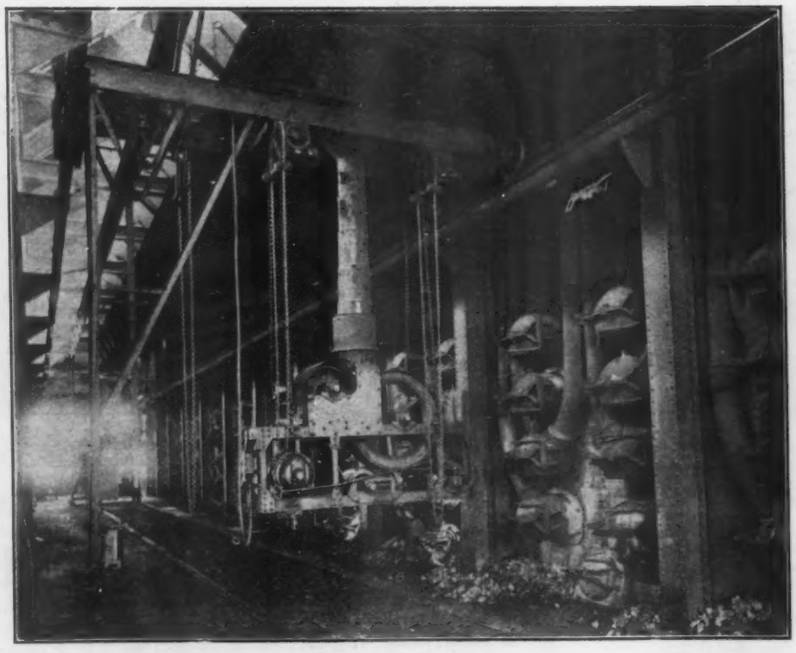

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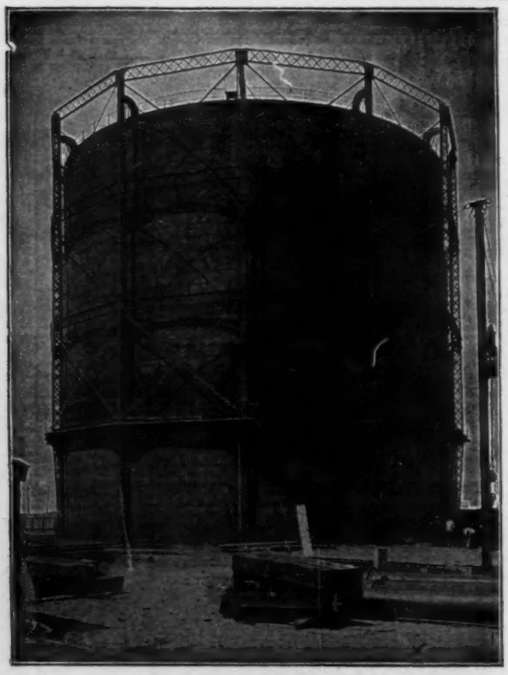

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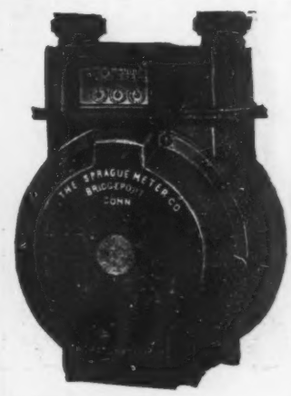

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